TECHNOLOGY

AUGUST 1953

FOUNDRY

...WHEREVER METALS ARE CAST

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DETROIT

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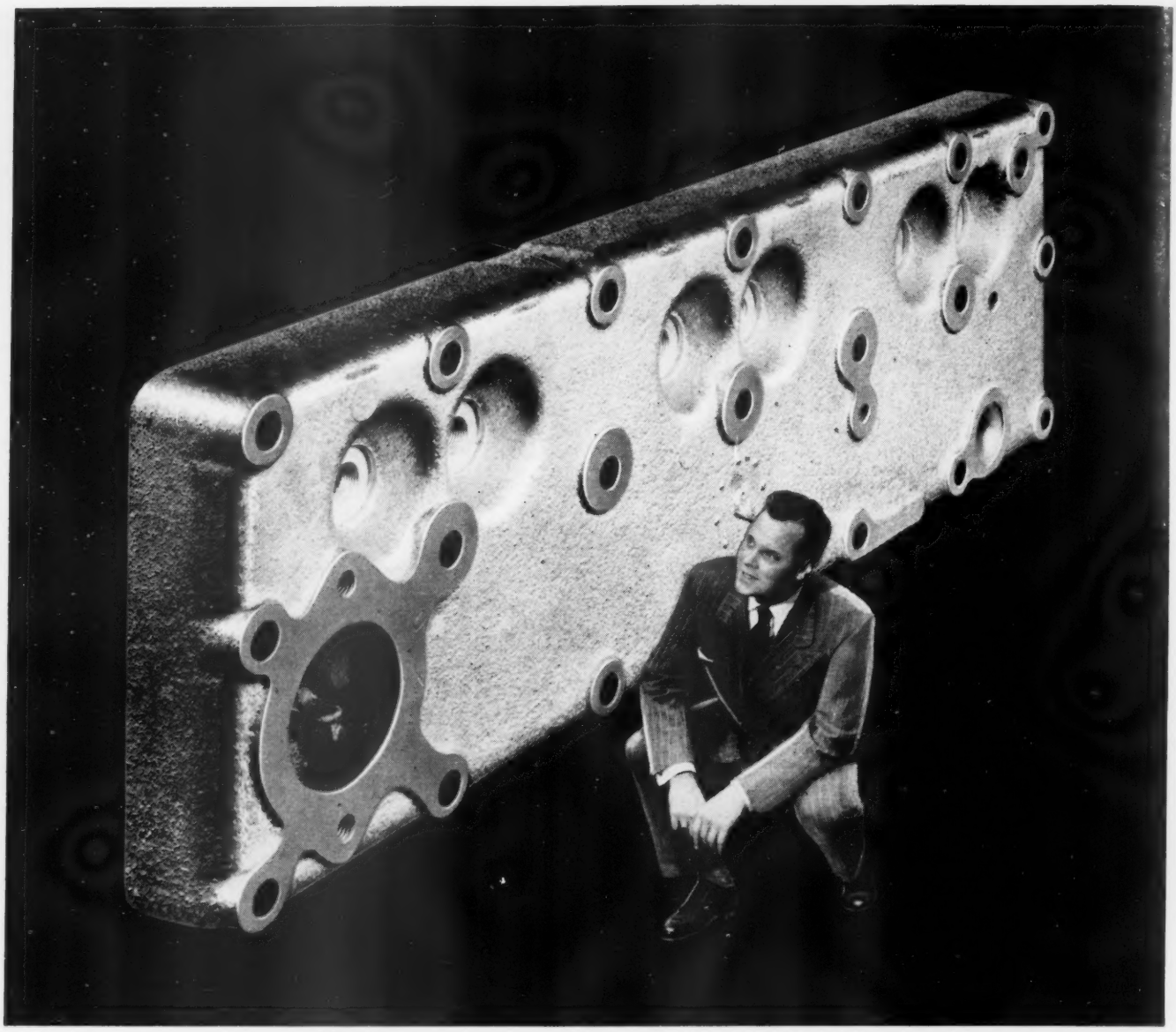
✔ Outstanding Opportunities for Foundries—page 100



PREMIUM CASTINGS ...clean...sound...easy to machine

This "Tell-All" Booklet is FREE!

Write Dept. F 84-32 at Niagara Falls for your copy, or call the FERROCARBO Distributor nearest you.

Your customer wants castings that are easy to machine. When *you* deoxidize your gray iron with FERROCARBO in patented briquette form, *he* can machine up to 35% more castings per tool, before resharpening. You can better guarantee him castings that are clean, sound, free of segregations and inclusions with more resistance to wear and heat shock.

600 leading foundries are now producing *premium* castings—both gray iron and malleable—by deoxidixing with FERROCARBO patented briquettes. Are you among them?

FERROCARBO DISTRIBUTORS:

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FERROCARBO
TRADE MARK

by **CARBORUNDUM**

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84-32

Reduce Your Shakeout Costs

You get quick, low-cost installation. Allis-Chalmers distinctive free-floating design means a simpler, less costly foundation on new as well as replacement installations.

You enjoy low maintenance, thanks to the simple two-bearing mechanism. Allis-Chalmers shakeouts have far fewer parts.

You are assured of long service through rugged, one-piece body construction. Users report units in excellent condition even after many years of continuous operation. A-4072

"FOUNDROMATIC" SHAKEOUTS

Foundry-proved Allis-Chalmers shakeouts are available in single or multiple units for every foundry need. For more information, call your nearby A-C district office or write Allis-Chalmers, Milwaukee 1, Wisconsin.

Only FOUNDROMATIC Shakeouts Give You All These Important Features

Plenty of vibration for largest loads within rating.

No shaft has ever broken on a *Foundromatic* shakeout.

All bearings rated to last a minimum of 5000 hours.

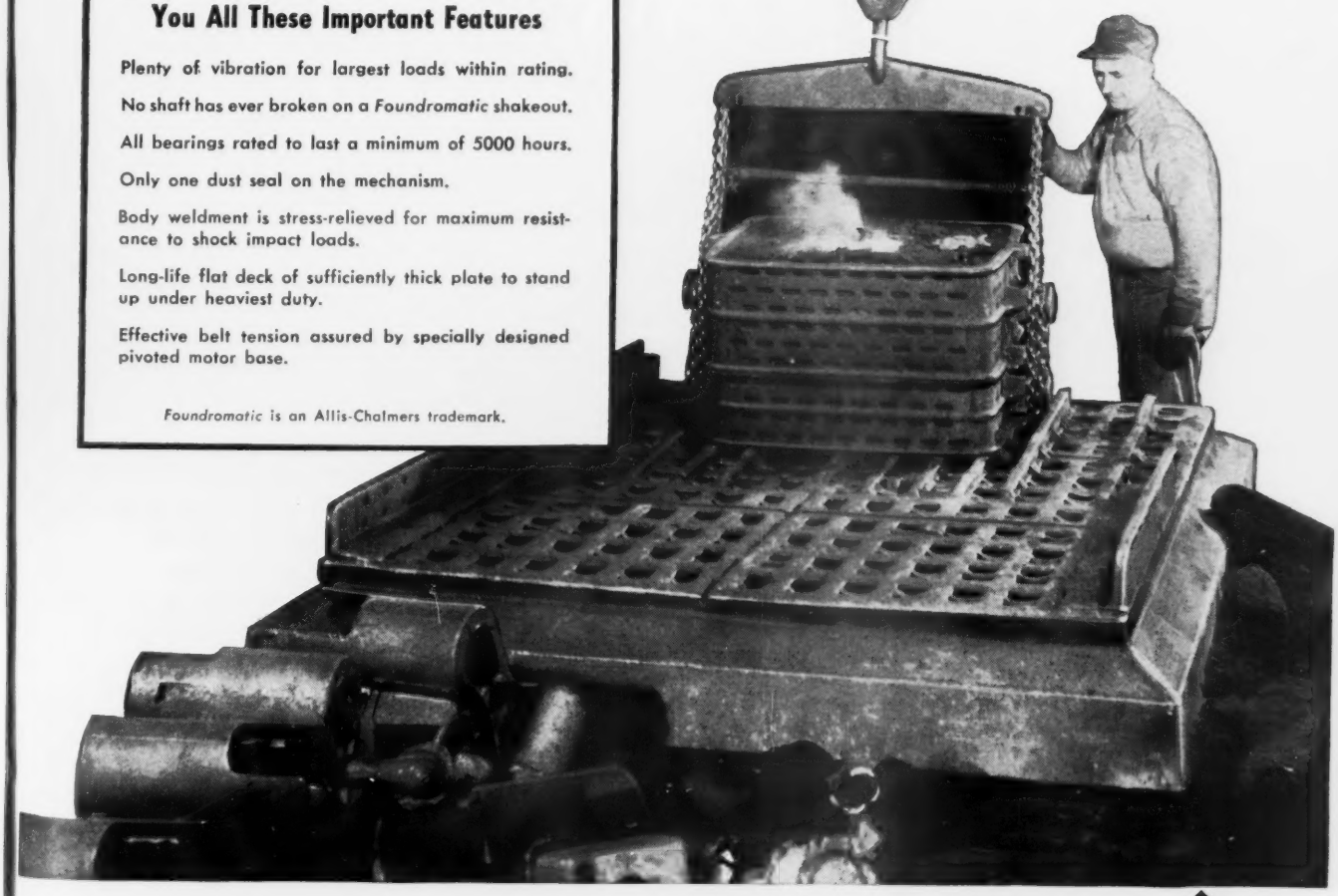
Only one dust seal on the mechanism.

Body weldment is stress-relieved for maximum resistance to shock impact loads.

Long-life flat deck of sufficiently thick plate to stand up under heaviest duty.

Effective belt tension assured by specially designed pivoted motor base.

Foundromatic is an Allis-Chalmers trademark.



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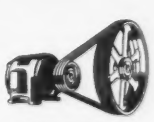
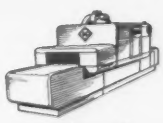
Foundry Equipment for Bigger Output—Better Working Conditions!

Vibrating Screens

Cupola Blowers

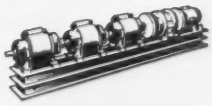


Motors-Drives Control



Foundromatic Core Dryer

Induction Heating & Melting



Regulex Arc Furnace Control

Easy does it!
sand preparation and control
can be easy — if you use
CROWN HILL SEACOAL,
FEDERAL GREEN BOND and
FEDERAL SAND STABILIZER

Honestly, sand preparation and control needn't be as complicated as some people make out it is. True, you've got to be sure carbon content is right—that green and dry strengths are high enough—that flowability is just as required. But this can be accomplished easily and economically through the use of three highly efficient and inexpensive sand additives. By using these materials in varying amounts, sand characteristics can be controlled and changed to satisfy specific requirements.

Carbon content is controlled by adding CROWN HILL SEACOAL. Green and dry strengths are varied through the addition of FEDERAL GREEN BOND. Flowability is provided by adding FEDERAL SAND STABILIZER.

There are other advantages, too! You can use common lake, river or beach sand for heap or system replacement. So, there's no danger of sand grain size being thrown out of balance—as happens when offals of cores made of coarse sand, mix in with the fines necessarily used with emulsified asphalt or resin additives. And most important of all—*these three additives will cost you less than $1.00 per ton of castings produced!*

Write today for your copy of new bulletin describing this *better* method of sand preparation and control.

CROWN HILL SEACOAL

Produced by *Federal* at Crown Hill, West Virginia. *High* in volatile combustible material, low in sulphur and ash content—basic requirements for a top quality seacoal. Ground or granulated to properly match the sand used.

FEDERAL GREEN BOND

Mined, processed and guaranteed by *Federal*. Unexcelled in uniformity and ability to develop green and dry strength. Possesses many times the natural bonding power of any other sand bond. Truly the best of the bentonites!

FEDERAL SAND STABILIZER

A processed cellulose sand additive whose high combustibility allows sand to expand evenly to eliminate casting defects. It increases sand flowability to provide better ramming conditions and attracts moisture to broaden the safe moisture range.

IMPORTANT . . . Federal Sand Stabilizer also holds lumpy shakeout to an absolute minimum!

FEDERAL

The **FEDERAL FOUNDRY SUPPLY** *Company*

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FOUNDRY

Volume 81—Number 8

AUGUST 1953

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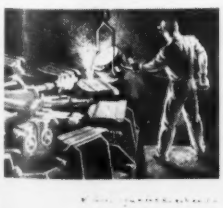

THE COVER: This reproduction of a painting shows the pouring of iron castings in permanent molds at Foundry Div., Eaton Mfg. Co., Vassar

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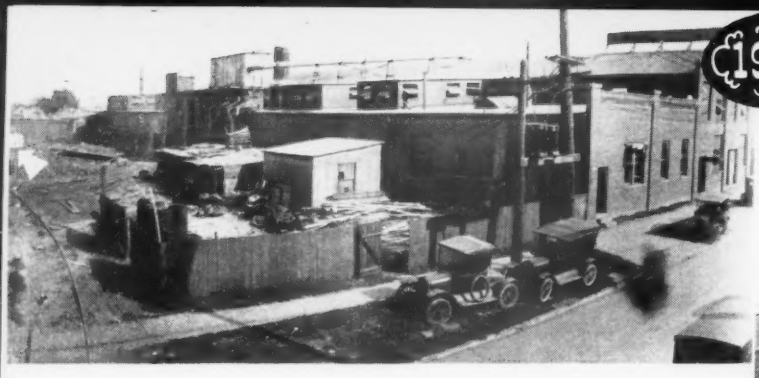
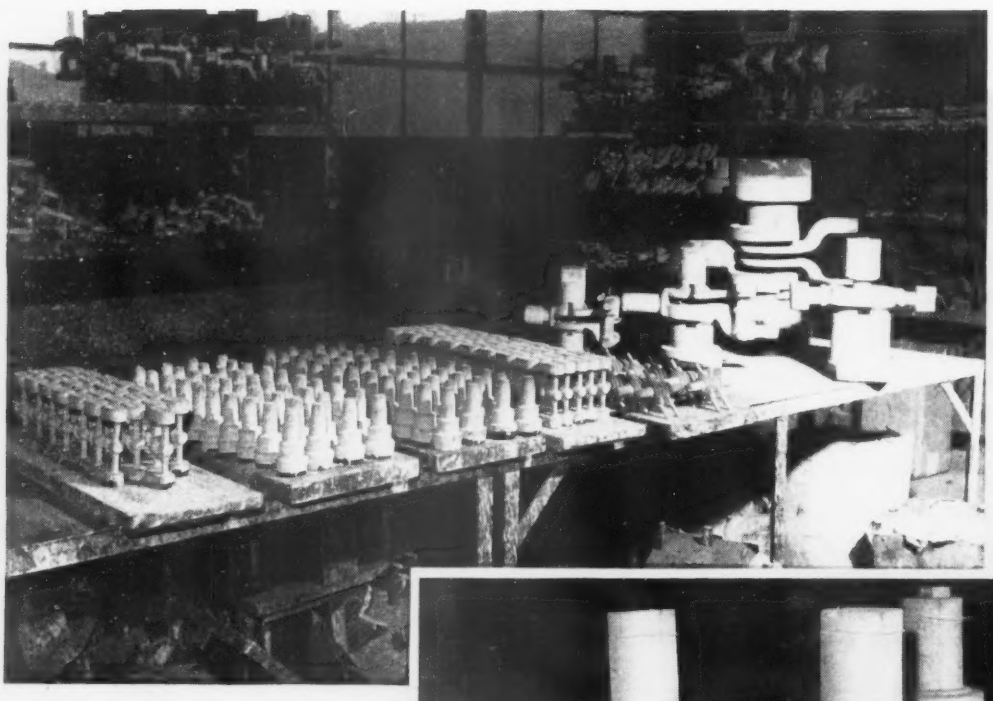


Parked "Model T's" date this early photograph of Atlas as it appeared at the outset of the roaring twenties. Seen at the extreme left background is the familiar stack of LINOIL drums.

Gone are the quaint "Model T's". In their place . . . in front of the modern, revamped Atlas foundry . . . stands the evidence of progress in the automotive field, an industry to which Atlas has made numerous contributions in the form of quality castings.



small, medium and large cores ...all made with LINOIL

Small delicate cores ready to be set in mold along with intricate assembled cores for hydraulic pump castings of varying sizes.

Housing cores for castings used in military equipment.

LINOIL endurance...

good insurance...

for quality cores

For a generation, a running inventory of LINOIL has been maintained in the Atlas yard—proof of its uniformity from shipment to shipment.

LINOIL withstands 33-year test of time at ATLAS FOUNDRY COMPANY, Detroit, Mich.

A third of a century in the fast-growing Atlas Foundry demanded a core oil with true endurance, constant top performance.

LINOIL has proven its ability to live up to the varying requirements of this large jobbing foundry, specialists in Meehanite castings of every conceivable size and shape.

Massive, 6-ton cores for machine tool castings to delicate 1-ounce cores are all made with versatile, trouble-free LINOIL...Why not try LINOIL in your next batch of core mix? Your LINOIL representative will be pleased to arrange a demonstration next time he calls.

Write for information on the ADM line of foundry products:
LINOIL core oil
INDUCTOL fast-baking core oil
LIN-O-CEL sand stabilizer
FRE-FLO parting compound

ARCHER • DANIELS • MIDLAND COMPANY

FOUNDRY PRODUCTS DIVISION • 2191 WEST 110TH STREET • CLEVELAND 2, OHIO

producers of **LINOIL** **INDUCTOL** **FRE-FLO** **LIN-O-CEL**

Another satisfied user of SCHRAMM AIR COMPRESSORS writes...

DE ANGELIS COAL COMPANY,
Anthracite Miners & Shippers
ONE CLEANED COAL

PHONE NO. [redacted]
1920

CARBONDALE, PA.

January 15, 1953.

Medico Electric Motor Company,
11 Tompkins Street,
Pittston, Pennsylvania

Attention : Mr. William Medico, President

Reference : Model 105 "Schramm" stationary air Compressor - #152187-S

Dear Mr. Medico :

Our program for 1953 will demand additional air compressor equipment. In checking the record of our last compressor purchase from you, we find that the Model 105 "Schramm" stationary, vertical, water-cooled air compressor, serial No. 152187-S, has been in continuous service since late November, 1944. This means that the unit, according to our records, has had over 15000 hours of continuous, satisfactory service. We cannot help but feel that this is quite a record in itself.

However, the most amazing discovery is that we have never spent as much as five cents for replacement parts. The outfit still has its original valves, bearings, gaskets, etc. Our plant engineer further confirms this statement. Eight years of satisfactory service and not a cent for repairs. This must be a record! You are privileged to use this report to acquaint your other customers of our experience with this unit.

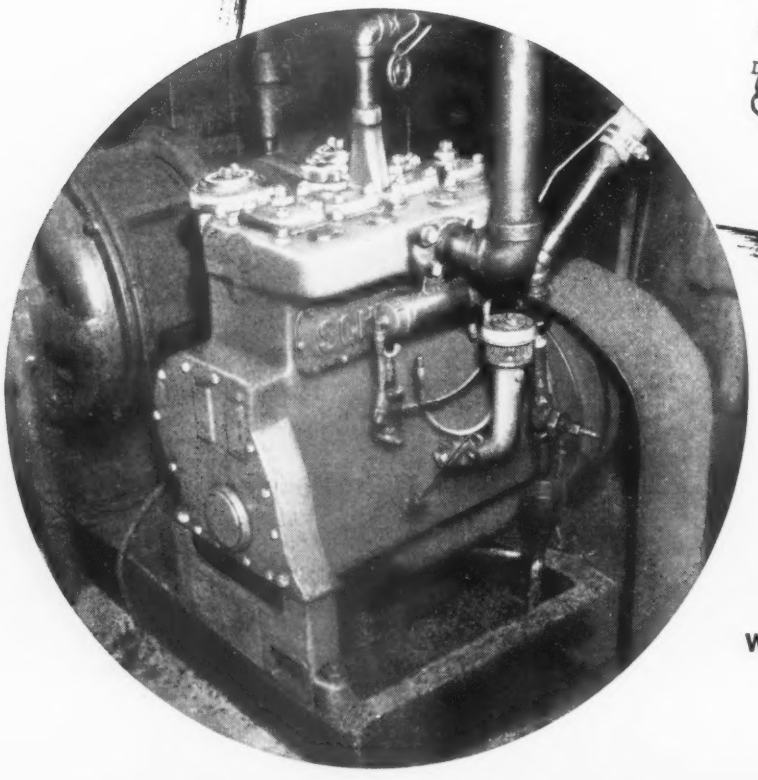
Naturally, we are inclined toward another dependable "Schramm" air compressor and I would like you to stop in and recommend the correct capacity "Schramm" that we desire to install as soon as possible.

The dependable performance of the equipment you sell to us is a source of great satisfaction and it always is a pleasure to do business with your company.

Very truly yours,

De Angelis Coal Company.

Joseph DeAngelis



SCHRAMM, INC.

The Compressor People

WEST CHESTER • PENNSYLVANIA

LET OUR

CUSTOMERS

give you a SALES TALK!

Only a superior, more economical product has the enthusiastic support of its users. These quotations tell you how experienced foundrymen feel about

ALSiMAG®

STRAINER CORES

COMPARISON TABLE

SAND CORES	AlSiMag STRAINER CORES
Disintegrate under rain or prolonged exposure to moisture.	NOT AFFECTED by water.
Must be handled carefully.	STRONG, stand fast, rough handling.
Some variation in size of cores and openings.	UNIFORM in all dimensions.
Eroded to varying degrees by stream of molten metal. Holes frequently enlarged as metal is poured.	NOT AFFECTED by stream of molten metal at normal pouring temperatures. Hole sizes remain uniform throughout pouring.
Eroded sand sometimes carried into casting by molten metal.	NON-SPALLING under normal metal pouring temperatures.
High percentage of breakage.	VIRTUALLY NO BREAKAGE.
Require hand reaming or cleaning of holes.	Clean, accurate, ready to use.

"We formerly made our own sand cores and thought they cost practically nothing. A careful check showed to our surprise that they cost us almost 3c each, which is more than your ceramic cores cost. Your cores are far stronger, handle faster, do a better job."

"We tested four makes of ceramic strainer cores. Three were unsatisfactory. AlSiMag cores stood up under all tests and we have had no strainer core troubles since using your cores."

"We had a lot of trouble with moisture getting in our sand cores. Your AlSiMag ceramic cores are not affected by any amount of water."

YOU CAN PROFIT FROM THESE EXPERIENCES OF OTHER FOUNDRIES! TRY AlSiMag STRAINER CORES AND LET YOUR OWN EXPERIENCE TELL THE STORY! TEST SAMPLES OF STANDARD SIZES FREE ON REQUEST.

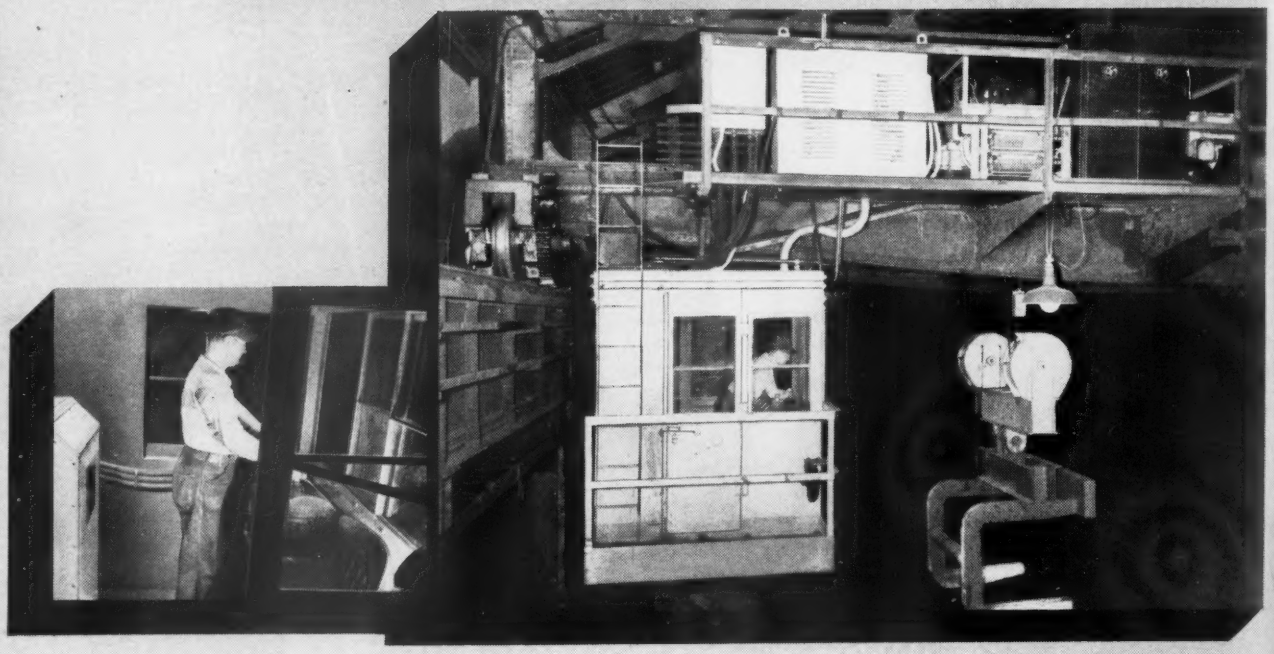
AMERICAN LAVA CORPORATION

A subsidiary of Minnesota Mining and Manufacturing Company

CHATTANOOGA 5, TENNESSEE

52ND YEAR OF CERAMIC LEADERSHIP

CRANE CAB operating temperatures lowered 65° to 70° F. at Hot Slab Mill



DRAVO SPLIT-TYPE CRANE CAB COOLER INSTALLED AT PITTSBURGH STEEL CO.

Hot slab mill operations produce ambient temperatures in summer of 150° F., creating a major working hazard for crane operators working over these "hot spots."

Pittsburgh Steel Company at Monessen, Pa., eliminated this hazard with a Dravo split-type Crane Cab Cooler. With the condenser section mounted on the crane and the conditioning section in the cab, crane cab temperatures are kept at 80° to 85° F. regardless of sudden temperature changes outside. Crane operators are healthier, more alert and more efficient.

CRANE CAB COOLERS PROVIDE YEAR-'ROUND AIR CONDITIONING

Dravo Crane Cab Coolers are ruggedly constructed, factory assembled and pre-tested to provide years of more-than-satisfactory service. All equipment in the unit is readily accessible with ample space for quick and efficient maintenance.

In the various air conditioning functions the crane cab cooler not only filters the air, removes dust, dirt and fumes, but heats the cab in winter, cools it in summer and provides constant ventilation the year around.

AVAILABLE IN SINGLE OR SPLIT-TYPE UNIT: IMMEDIATE DELIVERY

Dravo Crane Cab Coolers are built in two models—the self-contained unit, mounted on any available space on the crane and the new split-type unit where the condenser section is mounted on the crane, with the conditioning section in cab.

The Dravo Crane Cab Cooler can be easily and quickly installed on any type of crane with a minimum of down-time required. Units are available now! Write for more information —or phone the nearest Dravo Office and have our representative call on you. Ask for Bulletin QC 130

DRAVO

CORPORATION

Air Conditioning Department

Fifth and Liberty Avenues • Pittsburgh 22, Pa.

ATLANTA • BOSTON • CHICAGO • CINCINNATI • CLEVELAND
DETROIT • INDIANAPOLIS • NEW YORK • ST. LOUIS
PHILADELPHIA • WASHINGTON • PITTSBURGH

★ RUGGED

★ POWERFUL

★ EFFICIENT

A STEARNS lifting magnet moves scrap and pig iron fast . . . to where you want it — in one simple operation. Save hand labor and time . . . turn wasteful man hours into profitable minutes with a Stearns lifting magnet. Take advantage of the extra protection you get with Stearns Heavy-Duty construction. Stearns lifting magnets are experience engineered for greatest lifting efficiency . . . at rock bottom handling costs for magnetic materials.

Use a Stearns Lifting Magnet for: picking up pig iron, rails, scrap, bulky castings, sprues, gates, runners, hoppers, buckets, and many other uses. There are Stearns Magnetic Foundry Units for sand, grinding and separation, etc. Information sent upon request.

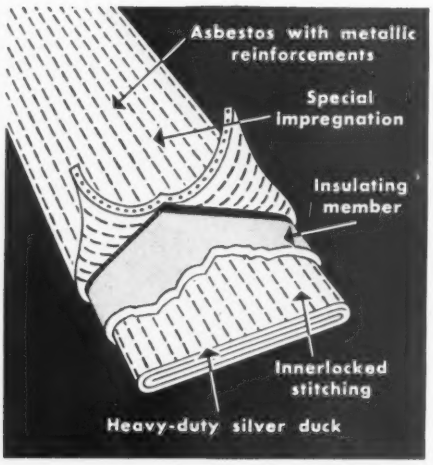
1004

MAGNETIC EQUIPMENT FOR ALL INDUSTRY

STEARNS MAGNETS

STEARNS MAGNETIC, INC.
662 S. 28TH ST., MILWAUKEE 46, WIS.

NEW armored belting resists abrasion and impact



WITHSTANDS HEAT, TOO!

Insulated SAHARA Belts have long been famous for maximum heat resistance and long wear. Almost every plant that has tested these belts now uses them exclusively for handling hot materials.

Now Imperial is manufacturing Sahara Insulated *Armored* Belting with wire reinforcements that gives extra value at no extra cost. The reinforcing wire is spun together with the asbestos fibers. Result: maximum resistance to abrasion and impact, as well as heat.

Tell us your belting problem and we'll recommend the belt that will cost you less in the long run. In addition to heat-resistant belts, Imperial also makes job-designed belts for handling boxes, crates, grains and other bulk materials.

Write for Data Sheet 48-4A.

Sahara Insulated Armored Belting

(Also Super Insulated)

Imperial
BELTING CO.
1755 S. Kilbourn Ave.
Chicago 23, Illinois

Engineered belting
. . . the right belt for each job

With the Editors

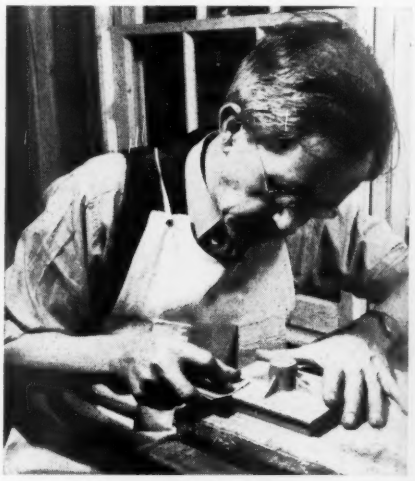
MAN-TO-MAN: Back in August, 1945, FOUNDRY presented a short article by Ralph L. Lee entitled "Man-to-Man on the Molder's Bench." The editors explained that this was the first of a series of brief, to-the-point comments having practical application to employee-relation problems. Well, the series has extended over a period of eight years, and still is going strong.

The author has continued to discuss the employee relationship or humanics in the foundry, but also has talked to management about many other problems that have to do with the successful operation of a plant producing castings. From the many letters and comments received by the editors, this series of articles has provided food for thought and a certain amount of inspiration for those in the management end of the foundry business. The editors look forward to presenting many more in this series.

Ralph Lee is one of the most unusual men it has been my good fortune and pleasure to know. In foundry parlance, they threw away the pattern after pouring one casting. Ralph started his industrial career in the Inventions and Engineering Section of the National Cash Register Co. and later joined the Engineering Department of Delco Light. It was here that Ralph came in contact with C. F. (Boss) Kettering, and the influence of that wonderful personality has continued through the years. Ralph was with General Motors Corp. for about 25 years, retiring in 1952, and during the latter portion of his work with that organization he specialized in human engineering, or training foremen and supervisory personnel.

It is rather hard to distinguish between Ralph's vocations and his hobbies. For years he piloted his own airplane. The early training at National has resulted in a number of inventions and patents. He has composed beautiful music, and plays a number of instruments, including the piano, pipe organ and cello. He has produced a number of unusual etchings. A flair for public speaking has brought engagements from all over the country. He is author of several books on training and supervision. He is an ordained minister and since retirement has been extremely busy as assistant rector of the St. James Episcopal Church, Birmingham, Mich.

But the foundry industry probably offers the greatest fascination for him. In all of his travels he never misses an opportunity to visit a foundry and talk with the men in the shop.



Ralph Lee makes his own patterns

His small model shop, the Lee Hobby Foundry, located in the backyard of his beautiful home in Birmingham, demands many hours of work but provides much satisfaction and pride. Many foundrymen from the world over have visited and enjoyed this foundry and have carried away a little of the enthusiasm of the proprietor (as well as that of Mrs. Lee the vice president in charge).

Ralph, all of us on FOUNDRY have enjoyed knowing and working with you these eight years. Congratulations on a job well done. But don't dare miss the deadline for the piece scheduled for the September issue.

—o—

Safety: Gray Iron Founders' Society reports that many foundries are purchasing its booklet "How You Can Work Safely," for distribution among employees. This booklet has been well thought out and excellently presented. It should be used by all foundries.

"Who Me?" is the title of a recent publication of the Travelers Insurance Company, Hartford, Conn., which points the finger of blame for most traffic accidents. Editors of company publications should find excellent copy in this booklet, and the publishers are anxious to have facts

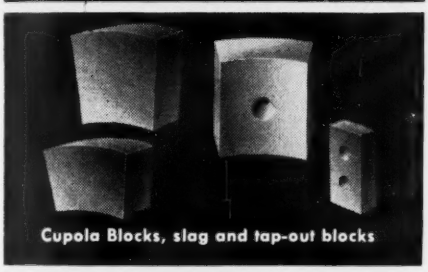
(*Concluded on page* 12)

Harbison-Walker

Foundry Refractories

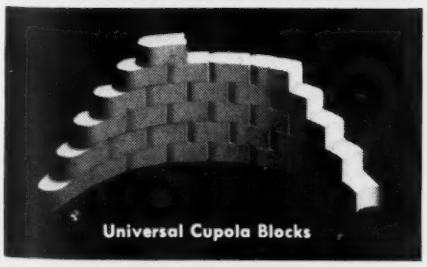
PROVED REFRACTORIES BRING LOWER OPERATING COSTS

Progressive foundries everywhere make good use of these and other Harbison-Walker products



Cupola Blocks, slag and tap-out blocks

Gate and runner brick



Universal Cupola Blocks

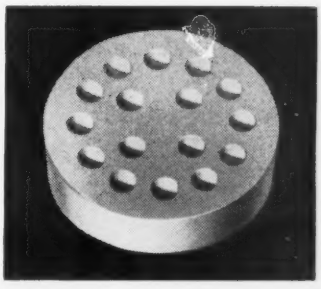
Monolithic lining and patching materials

Harbison-Walker provides a series of specialized foundry refractories for the most severe operating conditions in every type of furnace. Among these are the Universal Cupola Block that is easier to install and that fits all diameters; KUPLO-MIX and other monolithic lining materials; all classes of refractories for electric furnace roofs and walls; most modern and improved materials for hearths and bottoms. These and other Harbison-Walker products add materially to furnace life and help reduce operating costs.

From among Harbison-Walker's complete line of foundry refractories you can select those which best fulfill your exact requirements.

MORE AND BETTER CASTINGS WITH HARBISON-WALKER REFRACTORY STRAINER CORES

Harbison-Walker refractory strainer cores save money and increase production—Proved through wide experience with many million cores to be a decided help in producing better castings and reducing rejects. Write for full particulars.



HARBISON-WALKER REFRACTORIES CO.
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The right combination counts ... in grinding wheels too!

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Simonds grinding wheels have the right combination to put *you* in the 'chips' . . . the quality controlled combination of grain size and bond strength to stack up production . . . the sure combination for economical grinding, fast stock removal and long wheel life. Complete line includes everything for roughing, finishing, cutting off, polishing and sharpening. Whether *you* need grinding wheels, mounted wheels and points, segments or abrasive grain . . . you'll find Simonds your best deal for best results.

Write for free data book and name of your Simonds distributor.

SIMONDS ABRASIVE CO., PHILADELPHIA 37, PA. BRANCH WAREHOUSES: CHICAGO, DETROIT, BOSTON

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Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N. Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co. Ltd., Arvida, Que.

(*Concluded from page* 10)

and figures quoted.

The Timken Roller Bearing Co., Canton, O., is to be complimented on its recent decision to curtail all inbound and outbound truck traffic between its various plants, to customers and from suppliers, between midnight Friday and midnight Sunday in the interest of reducing weekend traffic tragedies. The move should be considered by all industry.

—o—

Cover: The beautiful 4-color illustration on the cover of this issue was made available through the kind co-operation of Ed Hoenicke, general manager of the Foundry Division, Eaton Mfg. Co., Detroit. The painting, which shows the pouring of castings on a rotating type permanent mold machine, originally was used in an advertisement of the castings produced by that division.

—o—

Award: Congratulations to Dr. James T. MacKenzie, technical director, American Cast Iron Pipe Co., Birmingham, on the Award of Merit from the American Society for Testing Materials. Jim received the award at the recent Atlantic City convention for his long and valuable service to Committee A-3 on gray iron, for his contributions to the ASTM committees, and for his liaison work with groups in related fields.

—o—

Delport Honored: The editors are quite proud of the fact that Vincent Delport, European Manager of FOUNDRY, was re-elected a member of the Council of the Institute of British Foundrymen at the recent annual conference, reported elsewhere in this issue.

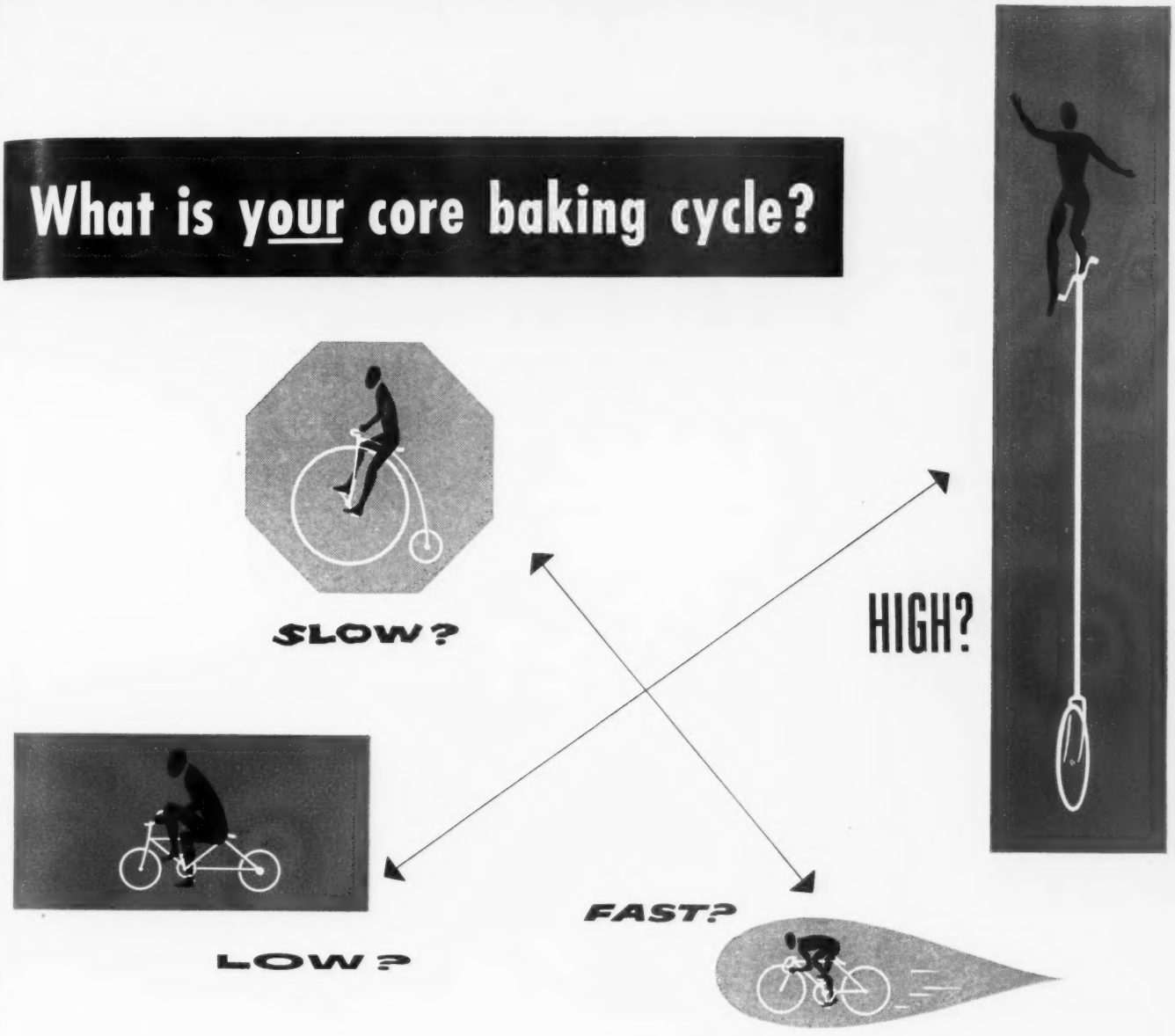
—o—

Open House: Dodge Mfg. Corp., Mishawaka, Ind., held open house at its plant on June 17 in celebration of its 75th anniversary. Families of employees, citizens of the community, and many business paper editors were taken on a well organized tour of the entire plant. I was particularly interested in seeing the mechanized gray iron foundry which Bob Herrmann described in excellent fashion in the July 1952 issue. Several photographs taken during the affair will be produced in a future issue.

—o—

September: Next month's issue will feature a report on foundry progress in a number of European countries, prepared by local technical authorities under the direction of Vincent Delport. I think you will find it interesting. F.G.S.

What is your core baking cycle?



Houghton Hy-Ten Core Oil adds safety to any bake!

Properly selected after knowing all the facts as to time and temperature, Hy-Ten Core Oil will meet the variables you have on your particular job.

Hy-Ten resists burning of the thin sections of small cores. It bakes out thoroughly in heavy walls of big ones. Shake-out is clean and easy. Scrap losses diminish.

Tell the Houghton Man what sand type, baking time, temperature, formula and metal you use. He will give you full details on the specific type of Hy-Ten that will provide good cores for your castings, bake after bake. Or write to: E. F. Houghton & Co., 303 W. Lehigh Avenue, Philadelphia 33, Pa.

Hy-Ten Core Oils . . . products of

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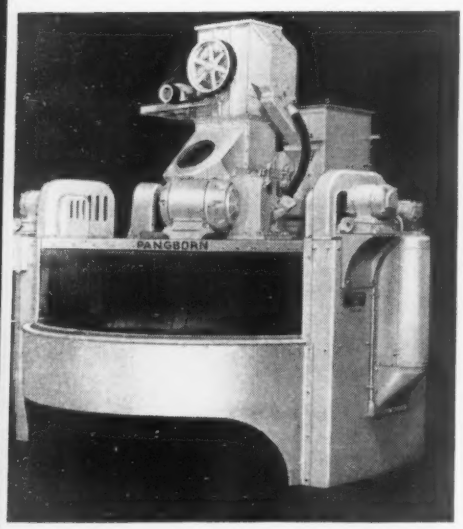
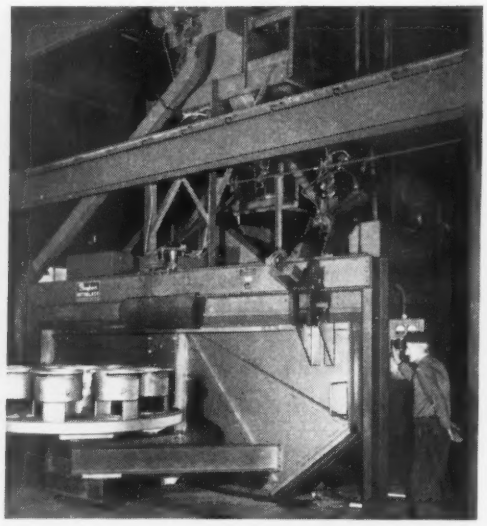
Ready to give you on-the-job service . . .

8 Ways Pangborn
and You--Time,

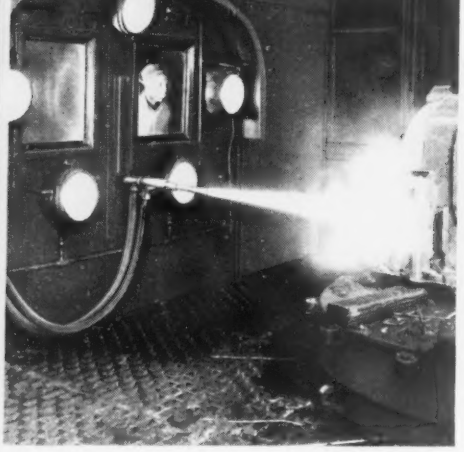


Pangborn ROTOBLAST® Tables for semi-continuous blast cleaning. Types and sizes for castings of all sizes with many surfaces, intricate shapes, and pockets.



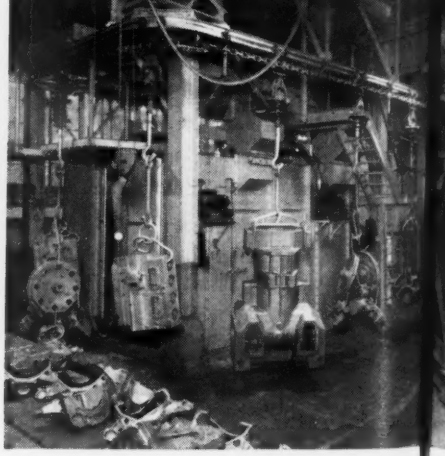
Pangborn Turnstyle Tables allow simultaneous loading and cleaning as one of two tables is always in blast chamber. For general blast cleaning.

Pangborn ROTOBLAST Table-Rooms clean castings from a few pounds to 2½ tons. Extremely efficient for jobbing foundries. Perfect for all-purpose blast cleaning.



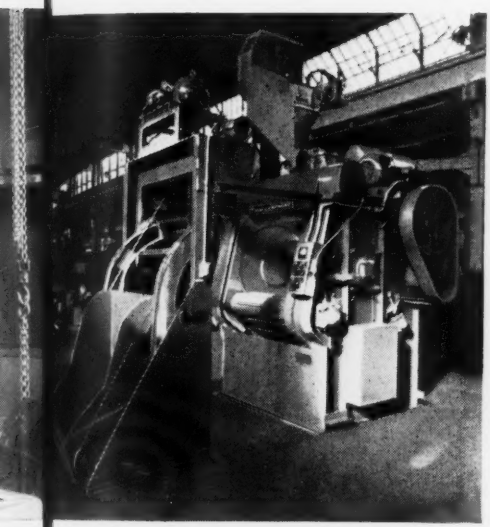
Pangborn Hydro-Sand Blast Rooms for simultaneous blast cleaning and core removal. Use high-pressure stream of sand and water operated from outside.

Pangborn Airless ROTOBLAST Rooms for general blast cleaning of extra-large castings. Neither compressed air nor water is necessary. Operated from outside.

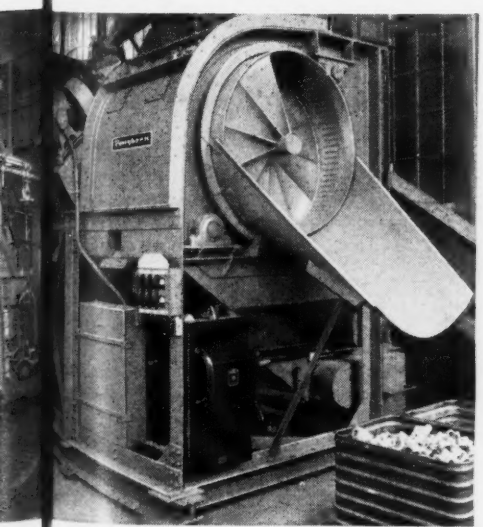


Pangborn special equipment for unusual blast-cleaning problems. Designed only after careful study by Pangborn engineers skilled in such problems.

Saves Industry Labor and Money



Pangborn Blastmaster Barrels for top efficiency in batch cleaning method. Newest addition to Pangborn line, features abrasive-tight door and automatic throw-out torque arm.



Pangborn Continuous-Flo ROTOBLAST Barrels for cleaning steady flow of miscellaneous work quickly. Operated by one man on production line basis.

HERE are just eight of the many types of standard Pangborn Blast Cleaning and Dust Control machines serving industry. For nearly half a century, Pangborn engineers with "know how" have been helping foundries save time, labor and money with these units as well as with specially-designed machines.

These engineers can do the same for *you!* They'll be happy to work closely with you, in recommending the exact Pangborn units you need, and in developing new equipment when necessary. No matter what *you* clean—large or small castings, fragile or intricate molds, or any combination . . . no matter what your dust problem, if dust must be collected at the source . . . it will pay you to find out how Pangborn can help you.

Send for the Pangborn bulletins that fit your needs. Just fill out the coupon below and mail to PANGBORN CORPORATION, 1400 Pangborn Blvd., Hagerstown, Md.

MORE THAN 28,000 PANGBORN MACHINES SERVING INDUSTRY

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BLAST CLEANS CHEAPER
with the right equipment for every job

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- ☐ Table Rooms
- ☐ Rooms
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Company.....

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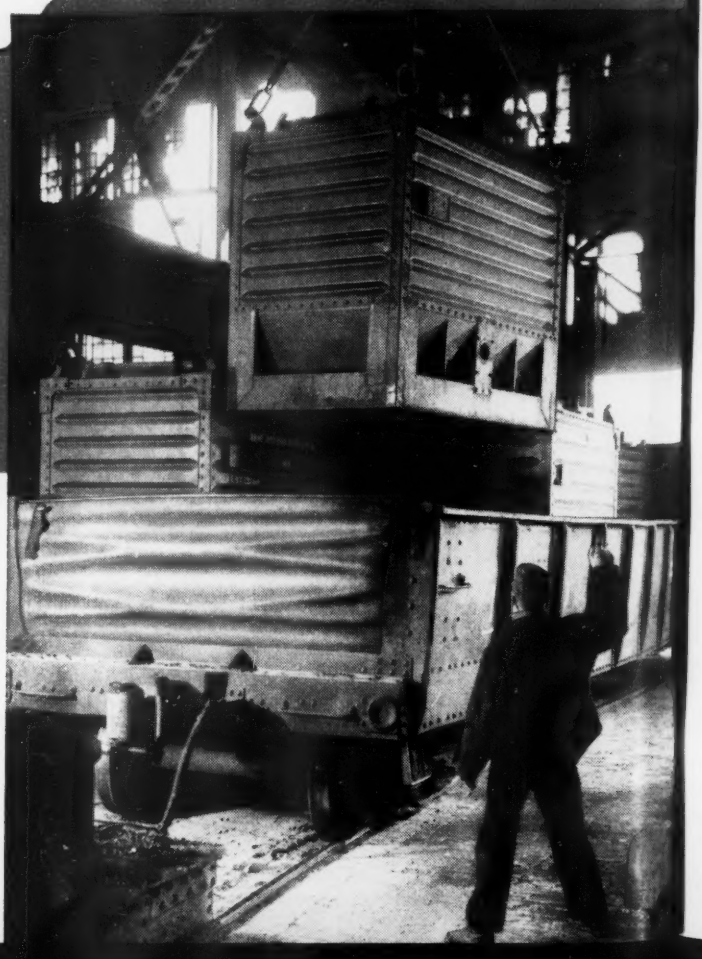
ELECTROMET'S "Simplex" FERROCHROME

REVOLUTIONARY DEVELOPMENT AIDS IN THE PRODUCTION OF STAINLESS STEEL

Pellets shown approximately 3/4 actual size.



1 EASY TO HANDLE

SIMPLEX pellets are usually shipped in bulk in container cars. Each container holds up to 10,000 lb. of material. As many as 12 containers, holding a total of 56 tons, can be shipped in one car. This makes it easy to handle large quantities of ferrochrome fast and economically, and prevents contamination.

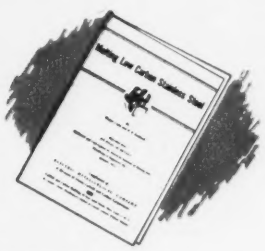
The terms "Electromet" and "Simplex" are trademarks of Union Carbide and Carbon Corporation.

SIMPLEX ferrochrome is a new chromium alloy specially developed by Electro Metallurgical Company to simplify the production of stainless steel. The alloy is suitable for producing all grades of stainless steel and is specially adapted for the extra-low-carbon grades.

Outstanding advantages of SIMPLEX ferrochrome are its extremely low carbon content and surprisingly rapid solubility. These characteristics make it possible to reduce furnace time substantially, and to obtain a consistently high recovery of chromium together with a high metallic yield.

SIMPLEX ferrochrome is uniformly sized. It is produced in the form of pellets about the size and shape of a walnut. It contains about 65 per cent chromium and about 6 per cent silicon. The carbon specification is 0.025 per cent maximum. Maximum 0.010 per cent carbon can be furnished.

For additional information phone, wire, or write one of the ELECTROMET *offices. Ask for the* ELECTROMET *booklet entitled, "Melting Low-Carbon Stainless Steel." It shows the advantages that can be obtained in producing low-carbon stainless steel with* SIMPLEX *ferrochrome.*



ELECTRO METALLURGICAL COMPANY

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30 East 42nd Street UCC New York 17, N. Y.

Offices: Birmingham · Chicago · Cleveland · Detroit · Houston
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In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario

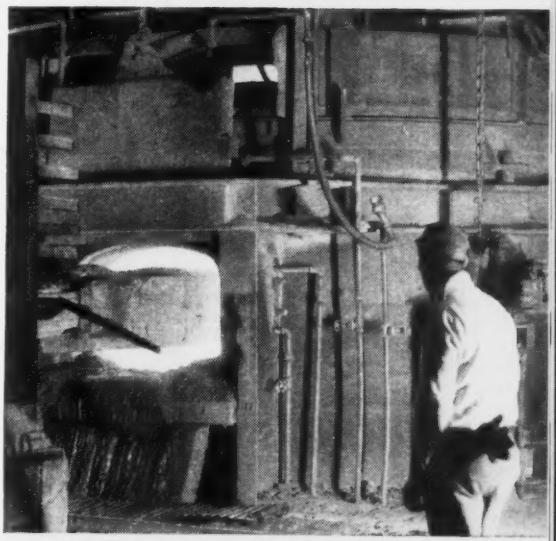
P-30995

2 LOW CARBON CONTENT

Here is the new SIMPLEX ferrochrome ready for charging in the production of a heat of extra-low-carbon stainless steel. The carbon content of the pellets is so low that the addition of SIMPLEX ferrochrome will not increase the carbon content of the bath.

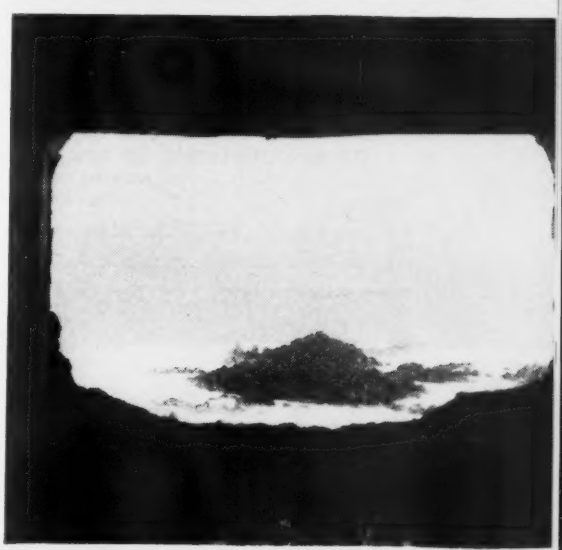
3 FAST SOLUBILITY

A charging machine dumps a loaded box of SIMPLEX ferrochrome in the bath. Because of the speedy solubility of the alloy in pellet form, as much as 15,000 lb. of SIMPLEX ferrochrome can be added to the furnace in one batch.



4 REDUCES FURNACE TIME

The alloy pellets dissolve in the bath more readily than does conventional lump ferrochrome. As much as 45,000 lb. of SIMPLEX pellets can be dissolved in slightly more than one hour. This means reduced furnace time.



5 HIGH METALLIC YIELD

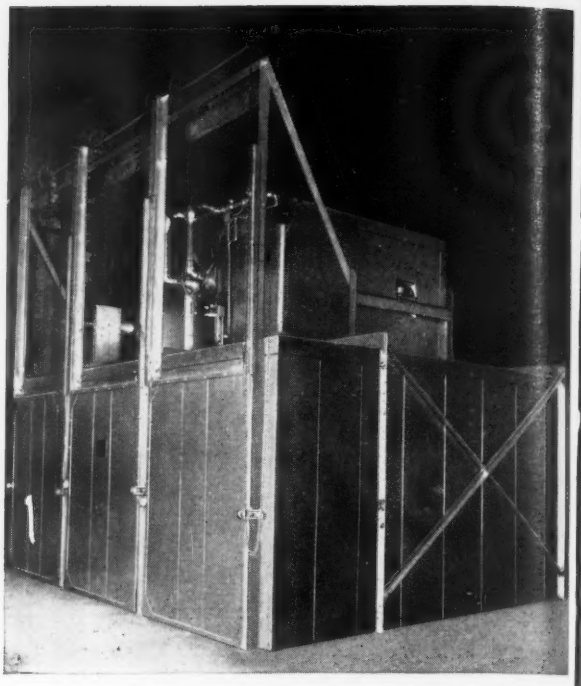
The metallic yield averages about 90 per cent when SIMPLEX ferrochrome is used, since the alloy contains enough silicon to reduce metallic oxides in the slag back into the bath. Overall chromium recoveries of 90 to 95 per cent are obtained regularly.

A LOT MORE THAN FANS DUCTS, HEATERS AND PANELS GO INTO . . .

LANLY FOUNDRY OVENS

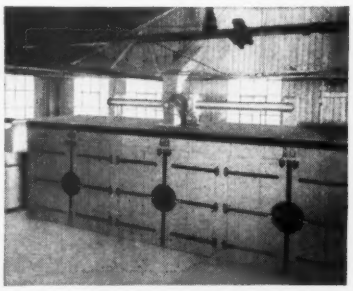
The proper adaptation and utilization of the essential component parts in every LANLY OVEN for maximum operating efficiency and economy, is a certainty being proved every day in foundries throughout the country. Specialized knowledge evolved from long experience and close cooperation with our customers enables us to design and erect better foundry ovens.

Upon receipt of information covering your needs, we will submit a proposal for an oven that will be thoroughly guaranteed as to construction and performance.

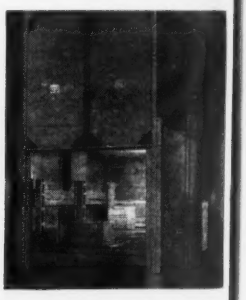


3 COMPARTMENT RACK TYPE OVEN

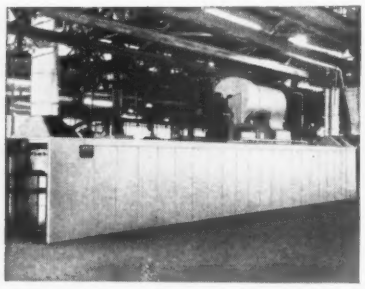
Uniformally heated by one compact, high capacity, air heater serving all compartments. Each compartment accommodates two core racks 4'-0" wide x 7'-0" long x 6'-0" high, loaded end to end.



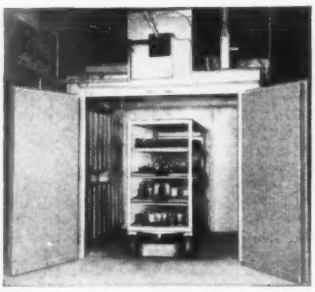
Three Compartment Rack Type Oven



Lanly Car Type Oven

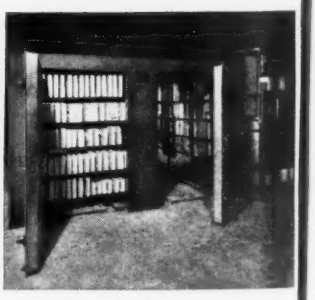


Continuous Core Blacking Oven



De-waxing Oven

Combination Rack and Drawer Type Oven



Plaster Mold Drying Oven

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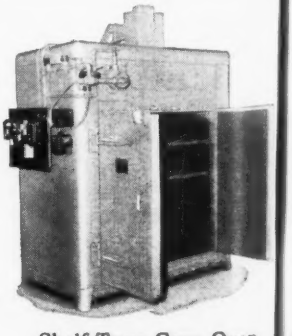

Shelf Type Core Oven

IT'S YOURS...FREE!

This NEW catalog helps you choose the *right* COATED ABRASIVE for every job!

30 HELPFUL PAGES...covering

METALWORKING: *Hand and machine operations.* Portable, disc sanding; contact wheel, platen, and slack-of-belt grinding; wet grinding; miscellaneous metalworking products; "MX" discs and depressed center wheels.

GLASS AND OTHER NON-METALLIC MATERIALS

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CONTACT WHEELS: Solid hub and Universal hub; plain and serrated.

GRINDING ATTACHMENTS: The "61" Port-A-Belt.

PLUS a section giving machine manufacturers, model numbers and their belt sizes.

Here's a real guide to coated abrasives for you. Makes it easy to select belts, discs, or cut sheets for any machine or hand abrasive operation—on metals, non-metallics, or wood.

The recommendations given are *complete*—including grain sizes and types, backings, coatings, product sizes, prices and packaging information. In addition, a special section tells who manufactures the machines used in most grinding or sanding operations, and the machine model numbers with their belt sizes.

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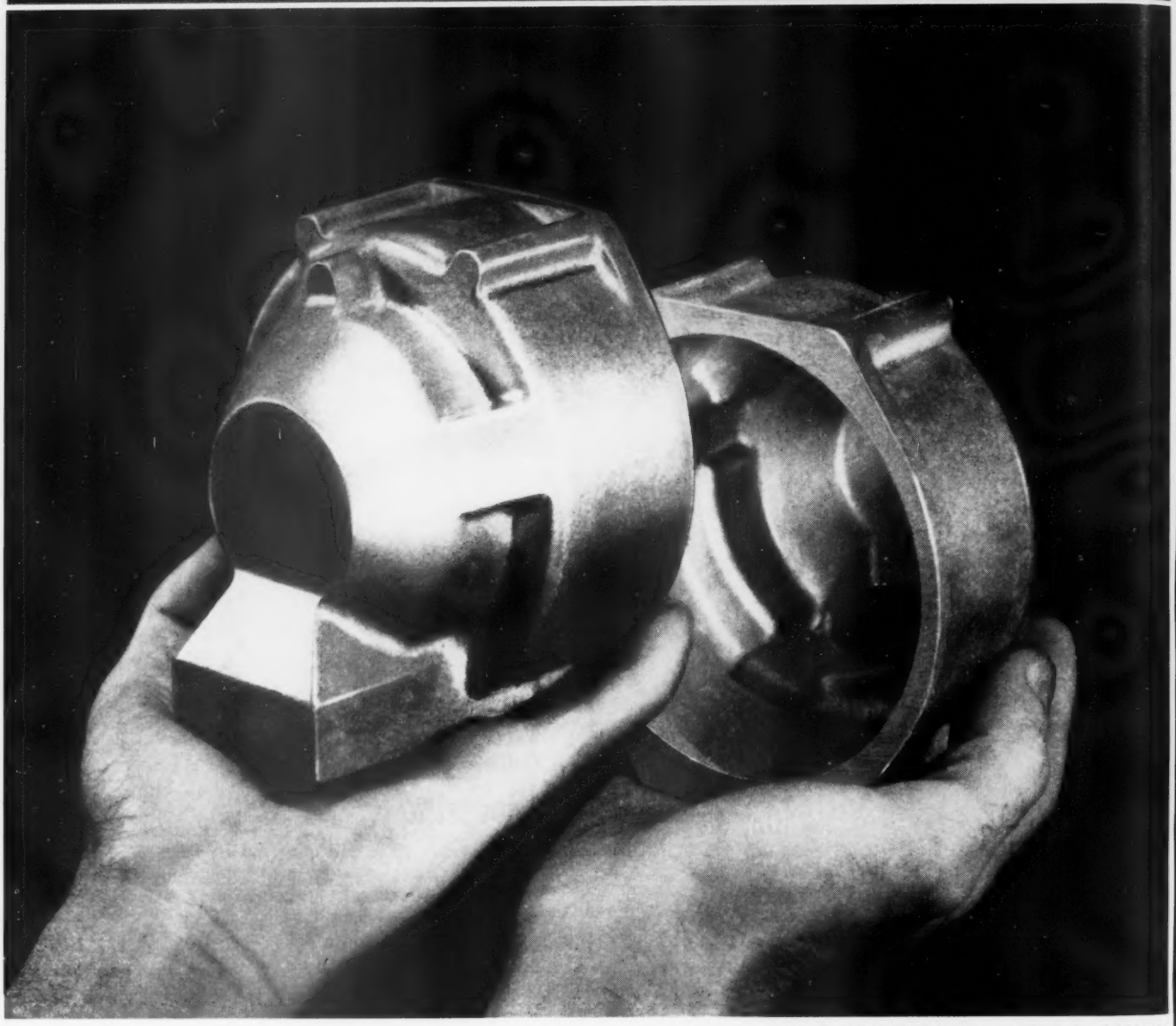
82-39

A PRODUCT OF FOUNDRY SKILL AND *Borden* SHELL-MOLD RESIN



Casting by TRUCAST CO., Newark, N. J., for SCINTILLA MAGNETO DIV., BENDIX AVIATION CORP.

Shell-casting cuts cost in half!

Look at shell-molding from your customers' viewpoint:

Scintilla Magneto Division used to buy these aluminum switch covers cast in conventional sand molds. Then they went to a foundry that cast them in shell molds with a Borden resin.

The shell mold castings, shown in the photo, were cleaner, sharper, smoother and more accurate. About ⅔ of the machining time was saved. Yet the shell castings cost far less per piece . . . even when writing off the shell patterns. The *finished cost* of the covers is *less than half* what it was before!

When buyers of castings hear about this kind of economy, they'll look for the foundry with shell-mold facilities. Borden foundry engineers can help you adapt the process to your needs. *Address: The Borden Company, Chemical Division, Dept. F83, 350 Madison Avenue, New York 17, N. Y.*

FOUNDRY PRODUCTS DEPARTMENT

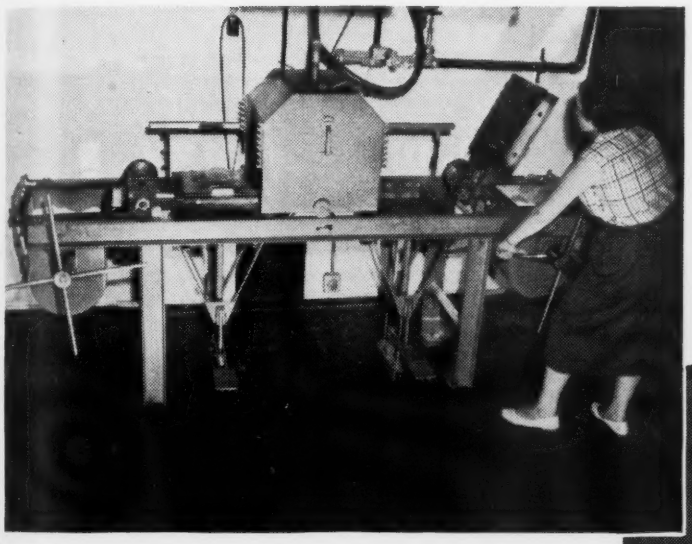
THE BORDEN COMPANY

Chemical Division

F.3.8

SEE... THE NEW TYLER SHELL MOLDING MACHINES

IN ACTUAL OPERATION . . .
Electric or GAS HEATED OVENS and PATTERN PLATES!



You can now heat your pattern plates with gas. The gas heating unit stays with the pattern plate at all times during the operation and holds plate at even temperature. Through the use of gas heating pattern plates, it is not necessary to strip heat or wire each plate, remove plate and insert next plate and continue with production. Eliminates wiring and maintenance.

See these machines in operation in our Sales Display Office.

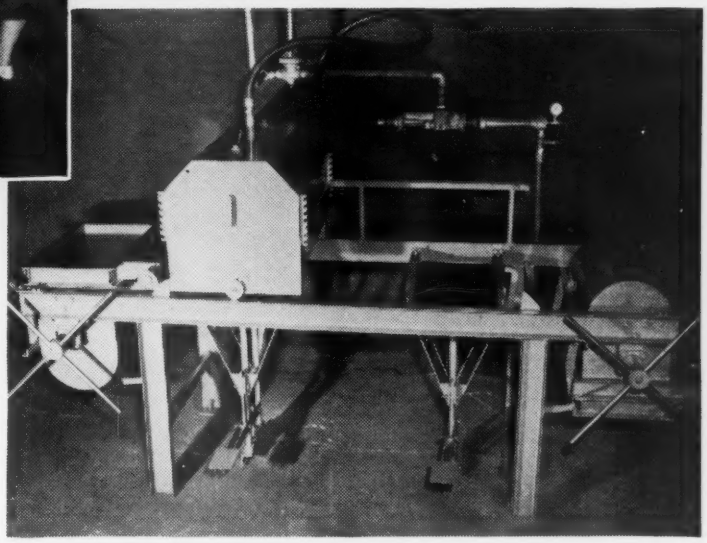


Photo above shows new gas heated pattern plate.
This machine 13″ x 12″ is priced at $1,250.00, plus heating units.

The machine pictured at the right, size 13″ x 24″ is priced at $1,750.00 plus heating units. All prices are F.O.B. St. Louis, Mo. One week delivery.

We also have fully automatic machines making castings from pattern plates sizes 24″ x 26″. The production rate of Tyler Molding Machine is one shell every 45 seconds.

TYLER METAL Products Company

METAL STAMPINGS — DESIGNERS & BUILDERS
SPECIAL MACHINERY — TOOLS — DIES — JIGS
FIXTURES — SHELL MOLDING EQUIPMENT

10TH & MULLANPHY STREETS
ST. LOUIS 6, MO.

TYLER METAL PRODUCTS CO.—
10th & Mullanphy, St. Louis, Mo.

I AM INTERESTED

☐ In seeing machine in operation

Date ..... Time .....

☐ Would like someone to call on our company with more information

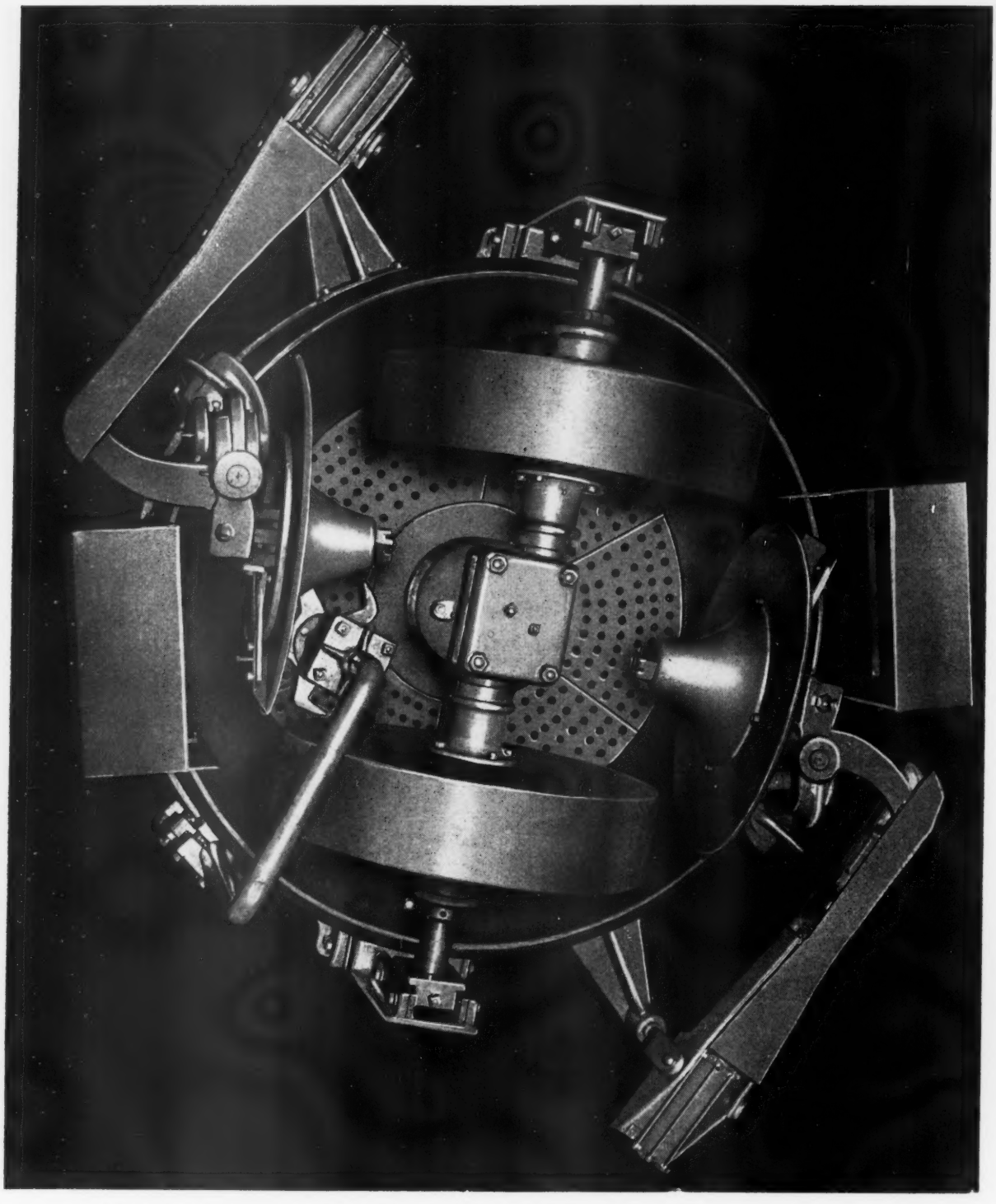
Date ..... Time .....

Company Name .....

Address .....

Signed ..... Title .....

THEY'RE PROVEN . . . . . ENGINEERED!



Double discharge points on opposite sides of Mixer furnished on special order only. Standard model has one discharge point.

you always get properly prepared sand with a . . .

Clearfield Mixer

Proper preparation of sand for good foundry results is a matter of precision—and can be consistently accomplished only by equipment engineered, designed, and built to encompass all the many factors involved. And that's a perfect description of Clearfield Mixers. There's a Clearfield Mixer to meet any sand preparation need. Write today for catalog No. 83 for complete details.

CLEARFIELD
MACHINE COMPANY

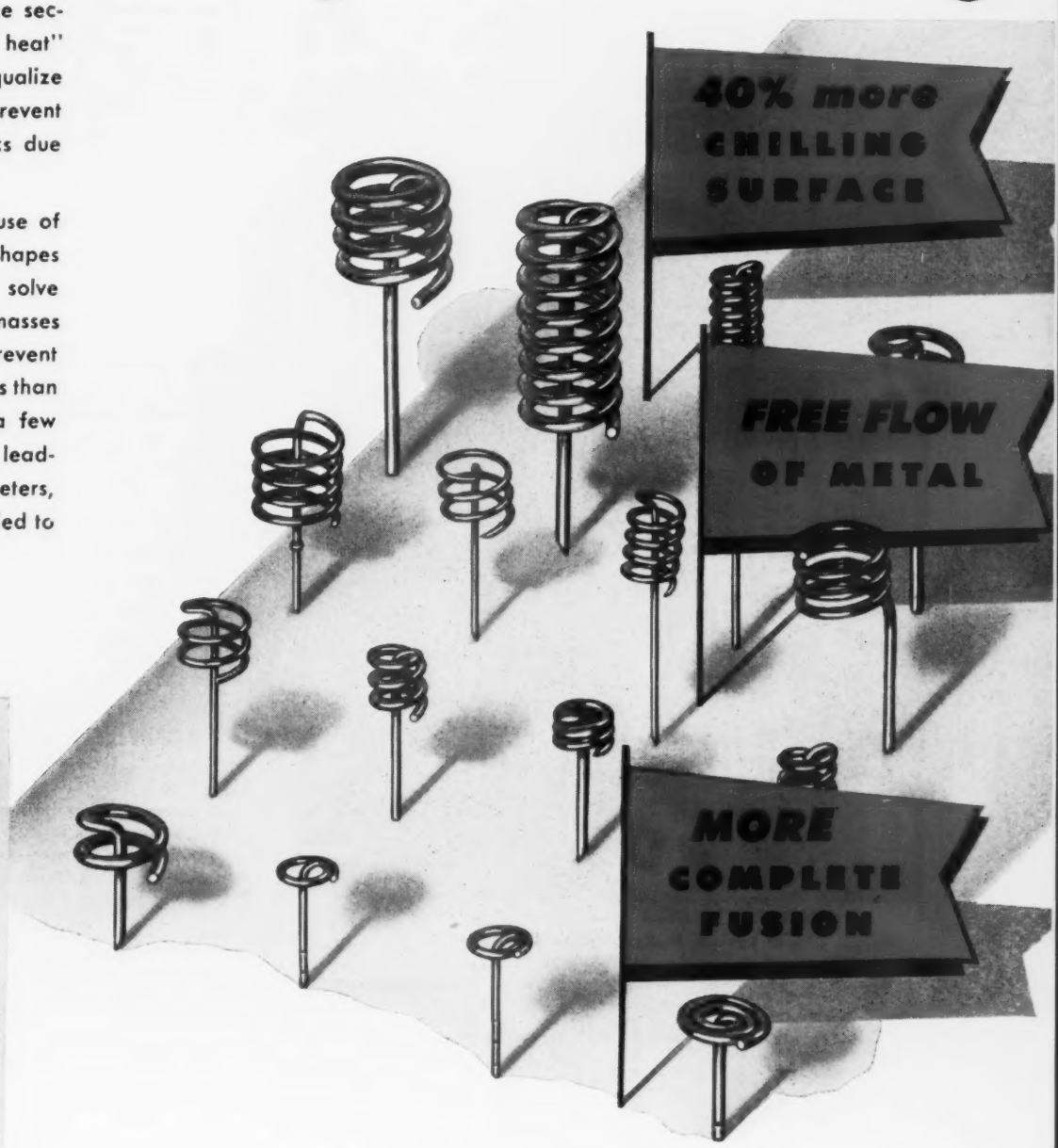
CLEARFIELD
PENNSYLVANIA, U.S.A.

fine FANNER CHILL COILS

YOUR BEST DEFENSE *against unsound castings*

• Castings with different size sections need "relief from the heat" in the larger sections to equalize cooling rate throughout—to prevent sponginess, checks and cracks due to uneven shrinkage.

Fine Fanner Chill Coils, because of their wide range of sizes, shapes and metals, enable you to solve cooling problems where large masses of metal are not involved . . . prevent rejects and get sounder castings than ever before. Illustrated are a few fine Fanner Chill Coils used by leading foundries. Gauges, diameters, coil and tail length can be varied to suit any job.



wrong

Showing how metal has kicked away from ordinary nail head used in light casting section.

right

Showing a perfectly solid casting with fine Fanner Chill Coils.

Write for complete catalog of fine Fanner Chills today.

THE FANNER MANUFACTURING COMPANY

designers and manufacturers of FINE FANNER CHAPLETS AND CHILLS

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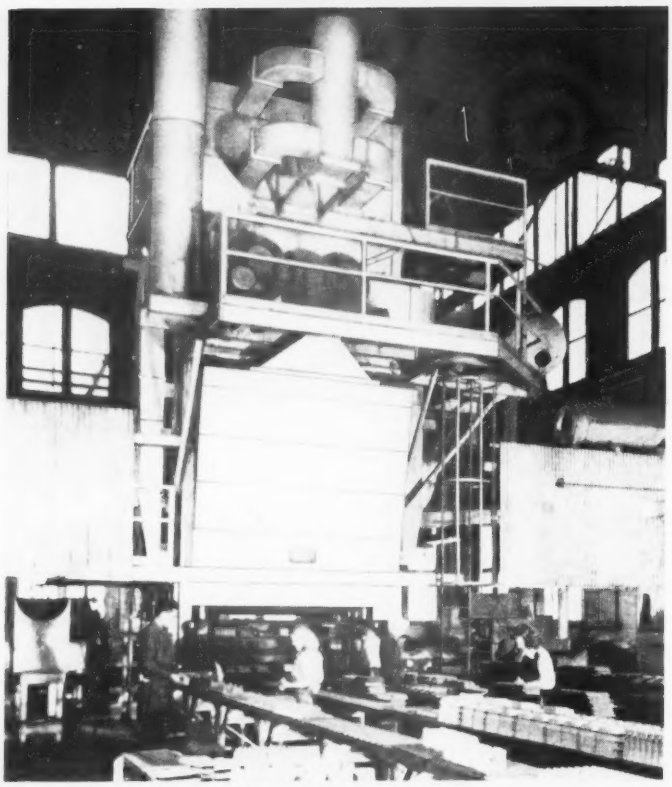
Dependability of COLEMAN OVENS

proved by repeat orders



Coleman Tower Oven
at Eastern Malleable Iron Company

The proper selection of core and mold ovens is vital to profitable casting operation. That's why it's important that you get all the facts about Coleman Ovens and see the performance records that prove their ability to provide substantial savings.

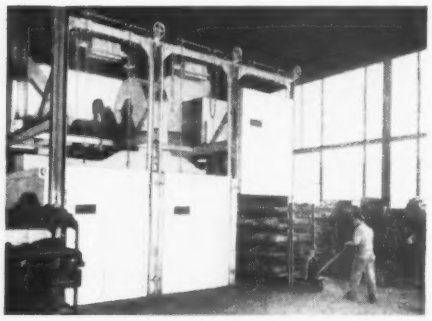
Over 80% of Coleman Ovens are "repeat orders" from customers...conclusive evidence of continuous, dependable performance in foundries of all types. You get over 50 years of know-how and experience in every Coleman Oven, so why gamble with inferior types?

There is a Coleman Core or Mold Oven to meet your requirements whether you have large production runs or small and specialized jobs. Our experienced engineers are available without obligation.

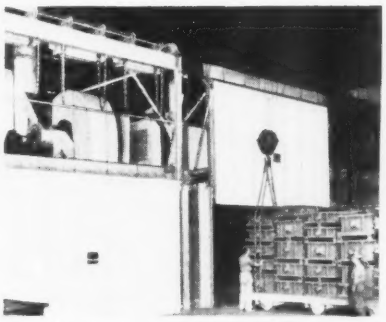
WRITE FOR BULLETIN C

A COMPLETE RANGE OF TYPES AND SIZES
for every core baking and mold drying requirement:

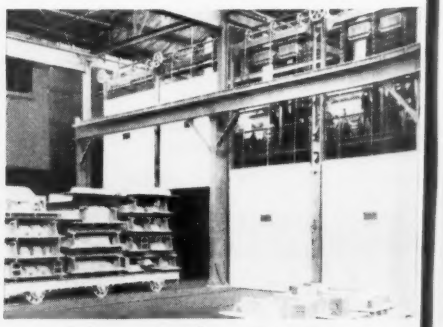
Tower Ovens • Horizontal Conveyor Ovens
Car-Type Core Ovens • Car-Type Mold Ovens
Transrack Ovens • Rolling Drawer Ovens
Portable Core Ovens • Portable Mold Dryers



Coleman Transrack Ovens
at Crucible Steel Castings Co.



Coleman Car-Type Mold Ovens
at Clark Brothers Company



Coleman Car-Type Core Ovens
at Cooper-Bessemer Corporation

THE FOUNDRY EQUIPMENT COMPANY

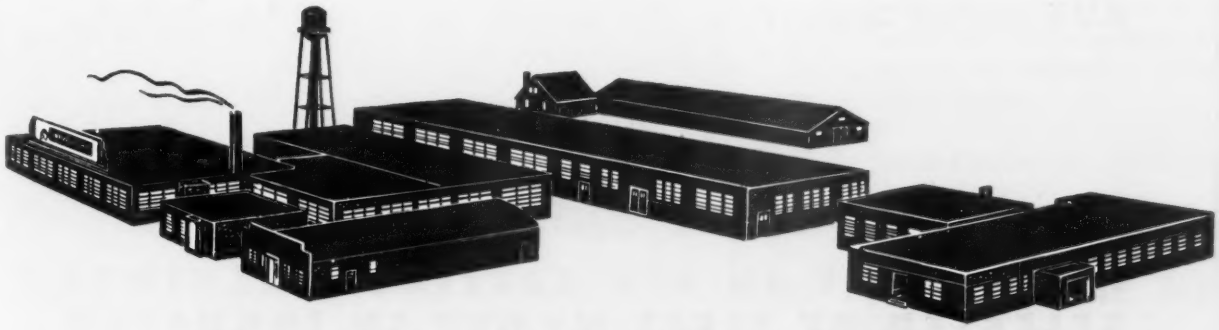
1831 COLUMBUS ROAD • CLEVELAND 13, OHIO

WORLD'S OLDEST AND LARGEST FOUNDRY OVEN SPECIALISTS

UNIVERSAL flask pins and bushings are typical of the quality products that have helped to build Universal's Frankenmuth plant

Universal Flask Pins and Bushings are heat-treated and precision ground from finest quality steels. They will save you precious minutes of production time by assuring instant, accurate alignment of cope and drag. Universal Flask Pins and Bushings will give you long, satisfactory service and they will stand up under extremely rough treatment, thus saving you the additional cost and down-time that replacement always requires. Universal Flask Pins and Bushings are typical of the quality products being produced at the big, modern plant of the Universal Engineering Company in Frankenmuth, Michigan.

The modern home of finer production tools



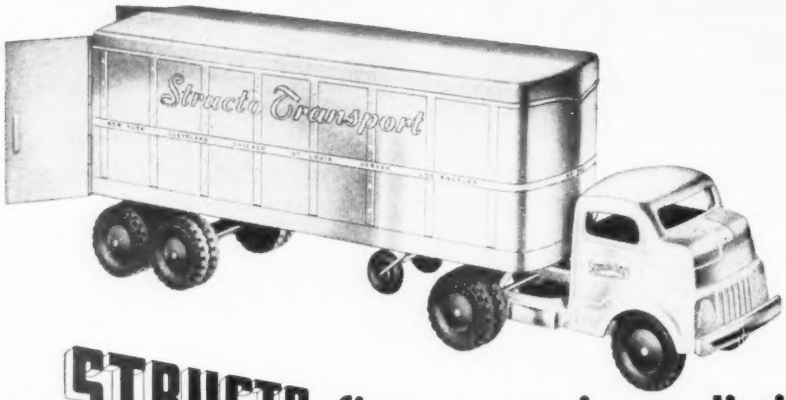
UNIVERSAL ENGINEERING COMPANY

FRANKENMUTH 4, MICHIGAN

188

KUX

FIRST NAME IN DIE CASTING MACHINES

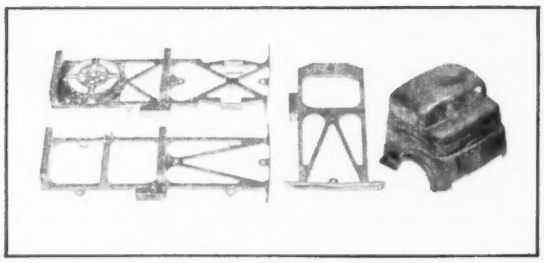


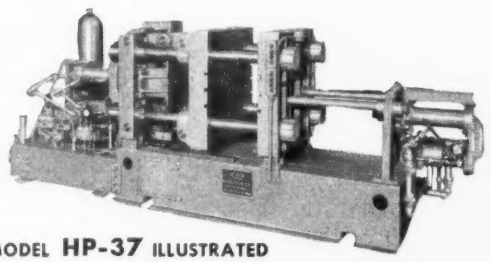
used by STRUCTO first name in realistic toys

UNGENTLE YOUNG HANDS put famous Structo trucks, trailers and steam-shovels through their "live-action" paces again and again. Toys have to be tough to take that. Structo *is* tough. Employing KUX die casting machines, Structo gets lightweight, structural castings of extra-ruggedness . . . to build toys that last a child-time of pleasure!

Is YOUR PRODUCT conditioned for the treatment it has to take? Quality die castings often make a tremendous difference in costs and saleability. KUX, first name in die casting machines, can make that difference for You!

Write for illustrated catalog showing complete line of KUX Die Casting Machines.





MODEL **HP-37** ILLUSTRATED

Hydraulically operated die casting machine for production of aluminum castings.

KUX MACHINE COMPANY • 6725 N. RIDGE • CHICAGO 26, ILLINOIS

KUX

FIRST NAME IN DIE CASTING MACHINES
SELECTED BY FIRST NAMES IN INDUSTRY

CARL-MAYER'S *important Development* in VERTICAL CORE OVENS

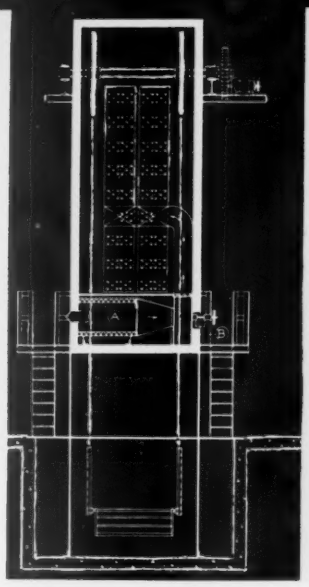


Fig. 1
NEW METHOD with heat fan inside oven. Patent No. 2628396.

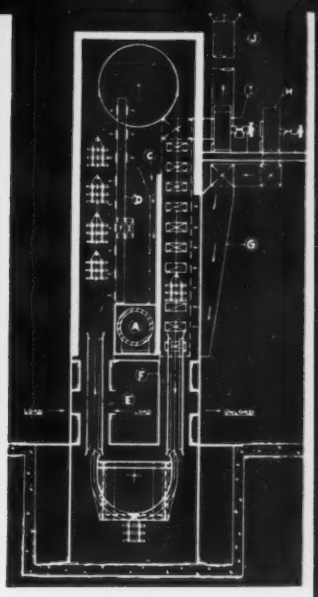


Fig. 2
Section showing conveyor travel thru pass, heating, cooling and exhaust system.

Vertical Ovens (Figs. 1 and 2) are by Carl-Mayer, using the universally adopted recirculating heating system with sealed combustion chamber located between the conveyor chains. Patent No. 2,257,180

EXCLUSIVE HEATING SYSTEM *pays off several ways!*

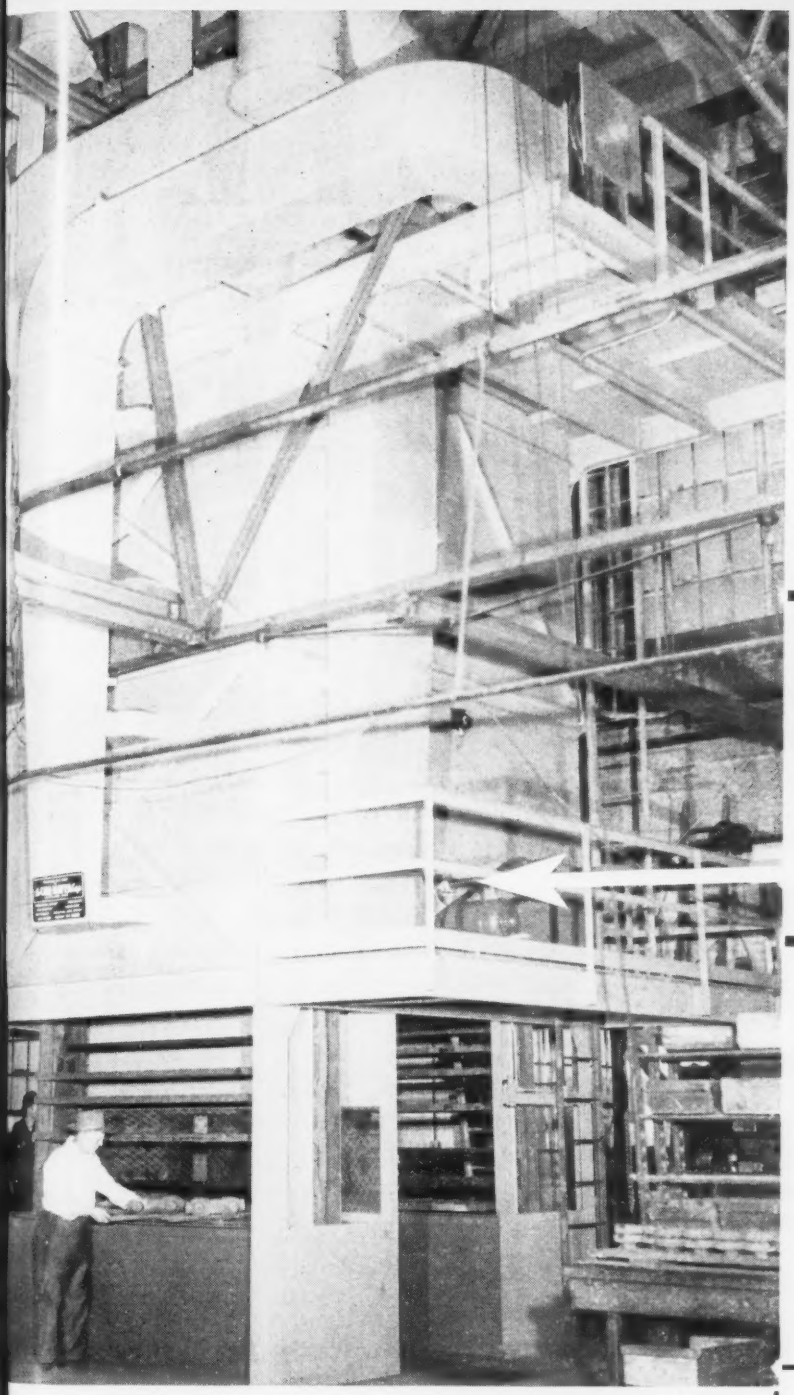
HEAT FAN INSIDE OF OVEN

- Saves platform space.
- Eliminates external heat duct, reducing heat losses.
- Placing heat fan *in* oven also reduces heat losses, resulting in high operating efficiency.
- By eliminating external heat duct and fan insulation, it reduces installation cost.
- There is no smoke as from external heat ducts.
- Oven appearance is greatly improved.

THIS IS BUT ONE OF THE REASONS WHY CARL - MAYER VERTICAL OVENS ARE THE CHOICE OF LEADING FOUNDRIES

Other important features contribute to faster baking, lower fuel consumption, smaller core losses, safer operation, elimination of smoke, cooled cores at unloading position and reduced labor cost.

Write for Bulletins No. 53-CM and HT-53



nt installation of Carl-Mayer Vertical Core Oven with combination gas and fired recirculating heating system, at G. & C. Foundry Co., Sandusky, Ohio

•

A few of our Vertical Oven Customers:

minum Co. of America
and Malleable Iron Co.
k Motor Div. of
eneral Motors Corp.
illac Motor Div. of
eneral Motors Corp.
tric Autolite Co.
d Motor Co.
mont Foundry Co.
G. & C. Foundry Co.
General Steel Castings Co.
Ingersoll Steel & Disc Div.
Borg-Warner Corp.
Richmond Radiator Co.
H. B. Salter Co.
Union Brass & Metal Mfg. Co.
West Michigan Steel Castings Co.
A. C. Williams Co.

ALL TYPES OF CORE, MOLD OVENS

Also other types of Industrial Ovens and Furnaces

• • •

THE CARL-MAYER CORPORATION

3030 Euclid Ave., CLEVELAND, OHIO

Backed by reputation and over 30 years' Experience

Wheels built to give you the

"TOUCH OF GOLD"

for rough grinding

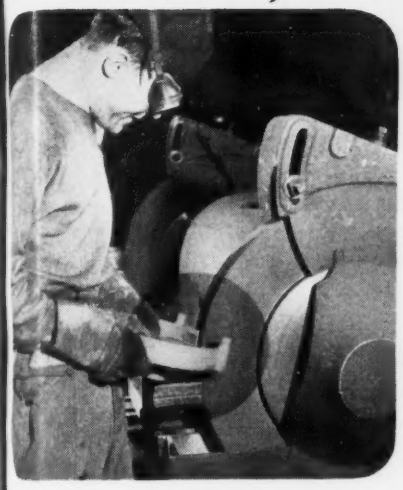
You have the "Touch of Gold" when the grinding wheel you are using exactly fits the job. Then each turn of the wheel adds value to the product and profit-margin to the operation. This is equally true whether you are working on ferrous or non-ferrous metals—on portable, floorstand or swing-frame machines.

Foundry men know that the selection of the *right* wheel assures faster stock removal. Longer-lasting, more efficient wheels contribute importantly to shop performance and profits.

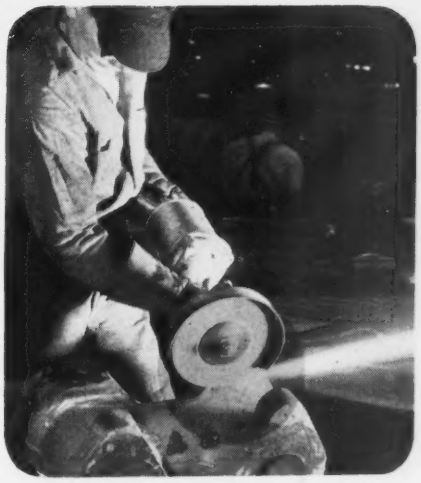
Norton's 56-page booklet on "Rough Grinding" can be a money-saver for foundry men. It is a real help in selecting the right grinding wheels. It covers many different applications including specific recommendations for grinding tough alloy and carbon steel, cast iron, soft malleable, hard malleable, brass, aluminum and magnesium. Ask your nearby Norton distributor's representative for a copy of this booklet or write direct for Booklet 1405F. NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities. *Export:* Norton Behr-Manning Overseas Inc., Worcester 6, Mass.

See your Norton distributor for aid in grinding wheel selection

Your Norton distributor will be glad to show you how the right grinding wheel can help you do your foundry grinding in the shortest possible time, at the lowest possible cost. Ask him for his recommendations. He's listed under "Grinding Wheels" in your classified telephone directory. He'll tell you more about the "Touch of Gold."



A NORTON WHEEL FOR FLOORSTAND GRINDING is made to do the job just right considering the spindle speed, type of metal to be ground, amount of grinding pressure applied, and area of contact.



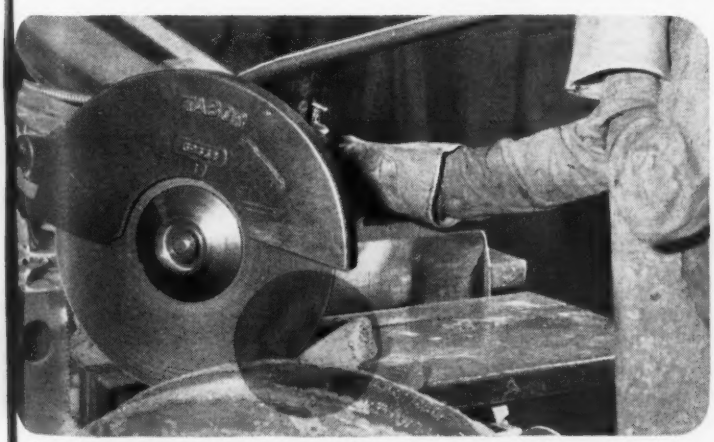
NORTON WHEELS FOR PORTABLE GRINDING are easy to use, cut fast and continuously because they have in-built balance and hug the work. They include straight and cup wheels, cones and hub wheels.

NORTON WHEELS FOR SWING FRAME WORK are made to remove a lot of metal — and fast. They're available in resinoid bond for high speed operation and BE vitrified for slow speed.

NORTON MOUNTED WHEELS AND MOUNTED POINTS are excellent for cleaning hard-to-get-at places. Available in both CRYSTOLON* and ALUNDUM* abrasives in resinoid and vitrified bonds.

NORTON ABRASIVE CORE FILES are effective and economical for touching up cores. Made of CRYSTOLON abrasive, resinoid bonded, and reinforced with steel, you'll find them lots more satisfactory than old steel files.

NORTON RUBBING BRICKS are just what you need for cleaning off sand and giving a casting a good going over. Made of CRYSTOLON abrasive they come in several grit sizes. The Norton distributor's man will suggest a good one for you.



NORTON CUT-OFF WHEELS include the Norton Type BN, *Reinforced Resinoid* Wheel shown here. Faster than band saws for cutting gates and risers, this wheel has built-in safety that assures protection against wheel breakage. The new Norton BFR *Reinforced* Hub Wheel is also handy for cutting and notching gates and risers and it does a good smoothing job as well.

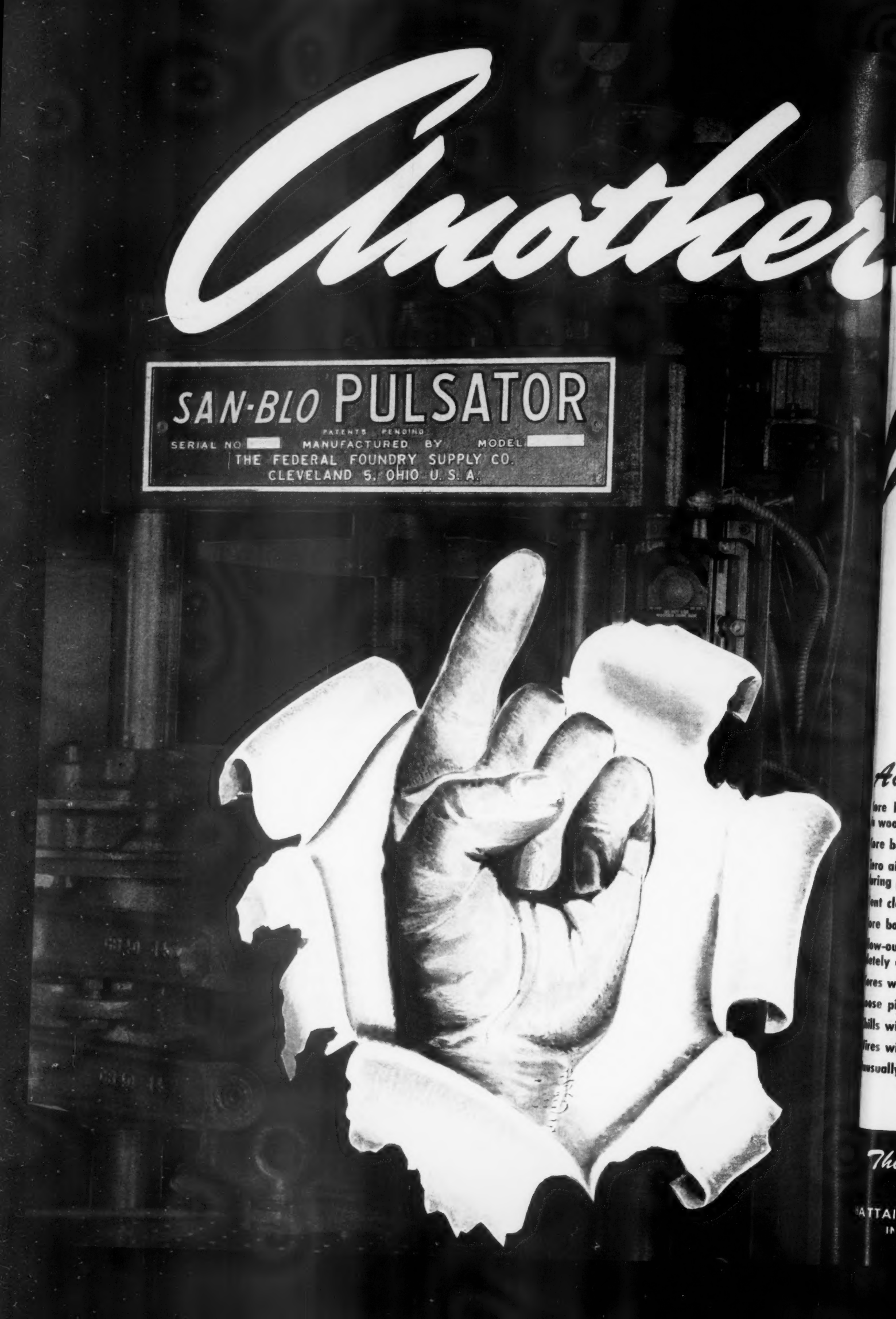
NORTON
ABRASIVES

Making better products

to make other products better

W-1490

*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries


Another
SAN-BLO PULSATOR
PATENTS PENDING
SERIAL NO. MANUFACTURED BY MODEL
THE FEDERAL FOUNDRY SUPPLY CO.
CLEVELAND 5, OHIO U. S. A.

FIRST for SAN-BLO

"LOW PRESSURE PRE-FILL"*

A new core blowing advancement by means of which *low air pressure* is used to fill core boxes and *full line pressure* used to pack the sand to desired hardness.

**Now standard equipment on all SAN-BLO Pulsator Model core blowing machines, and available, as an accessory, for all standard models.*

The first SAN-BLO core blower, introduced by FEDERAL only a few years ago, revolutionized core blowing. Its radically new operating principle made it possible for foundries to blow more cores than ever before—to blow a wider variety of core sand mixtures—to blow wooden as well as metal core boxes—to produce a wide range of core sizes without time-consuming changes and adjustments—and turned a complicated operation into a simple action.

FEDERAL engineers, constantly working to improve foundry equipment, have now perfected still another means for extending the practice of core blowing—LOW PRESSURE PRE-FILL. This sensational development was possible solely because the SAN-BLO uses *"motor-driven plows" in its sand magazine to move sand over the blow holes and an "aerating air circuit" to introduce air into the lower section of the sand magazine.* These features, plus the LOW PRESSURE PRE-FILL mechanism, make it possible to *fill* core boxes with loosely packed sand, using low air pressure and then, with full line pressure, to *pack* the sand to correct hardness.

LOW PRESSURE PRE-FILL core blowing, therefore, does away with the destructive *blasting* of sand under high pressures and removes the obvious limitations imposed by the use of high pressures in blowing sand in core boxes. The many resulting advantages are listed directly to your left. And, what's very important, it makes possible the successful blowing of many complex, wooden core boxes previously considered beyond the capabilities of core blowing machines.

If you're interested in getting more core boxes off the bench and into core blowers—if you're faced with the necessity of reducing core room costs—if you've been having trouble getting experienced core room workers—then the SAN-BLO Pulsator with LOW PRESSURE PRE-FILL can be of tremendous help to you. So, why not learn more about it? Write for complete information—NOW!

Advantages

- ore box wear minimized—n wood or metal boxes.
- ore box repairs minimized.
- ero air pressure in core box uring pre-fill.
- ent cleaning is minimized.
- ore box cleaning minimized.
- low-outs at box joints com-letely eliminated.
- ores will not stick to boxes.
- ose pieces will not wedge.
- ills will stay in place.
- ires will stay in place.
- nusually clean operation.

"SERVING THE FOUNDRY INDUSTRY FOR FORTY-FIVE YEARS"

FEDERAL

The **FEDERAL FOUNDRY SUPPLY** *Company*

4600 EAST 71st STREET, CLEVELAND 5, OHIO

ATTANOOGA · CHICAGO · DETROIT · LOS ANGELES · MILWAUKEE · NEW YORK

IN FRANCE—SA. PH. BONVILLAIN & E. RONCERAY, Rue Paul-Carle a Choisy-Le-Roi, Seine

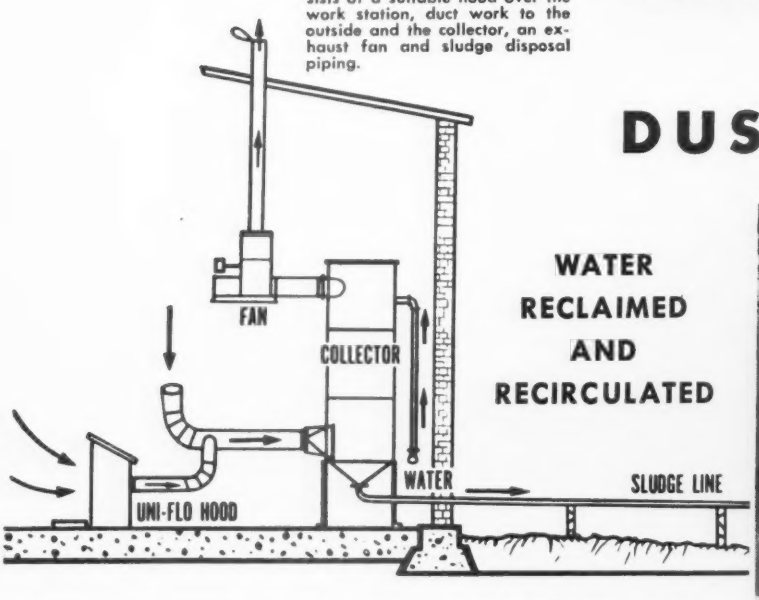
FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

DUST IS NEVER DUST AGAIN

when it's collected with MULTI-WASH

WET METHOD DUST COLLECTORS

This diagram shows the simplicity of the Multi-Wash system. It consists of a suitable hood over the work station, duct work to the outside and the collector, an exhaust fan and sludge disposal piping.



Dust that enters a Schneible MULTI-WASH COLLECTOR ceases to be dust. It is transformed into sludge and can never again cause air pollution.

This feature alone, is one reason why so many foundries and other industries prefer the MULTI-WASH wet method system of dust control. There is no handling of dust *after* it is collected.

Dust, abrasive particles, and all smoke and fumes are efficiently removed from the air. They pass through the MULTI-WASH unit while the air is washed, not once, but many, many times. The collected particles are released in the effluent to be sluiced to a settling and dewatering tank, for clean, efficient removal. Where conditions call for fill material such sludge is dumped directly on the premises, without fear of causing any further air pollution.

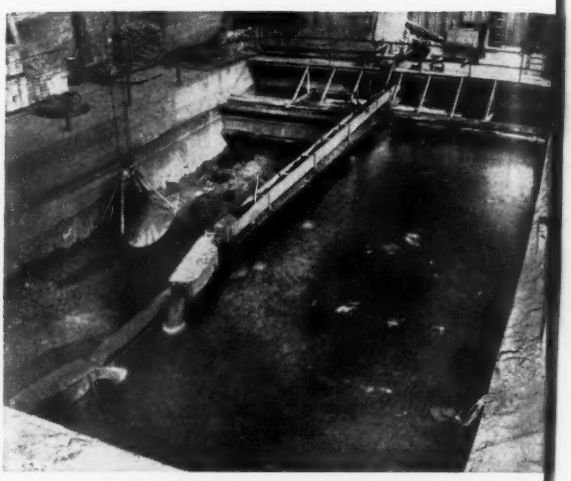
If you are considering any dust control it will pay you to investigate and invest in a Schneible MULTI-WASH SYSTEM. Write direct or call your nearest Schneible representative, NOW!

CLAUDE B. SCHNEIBLE COMPANY

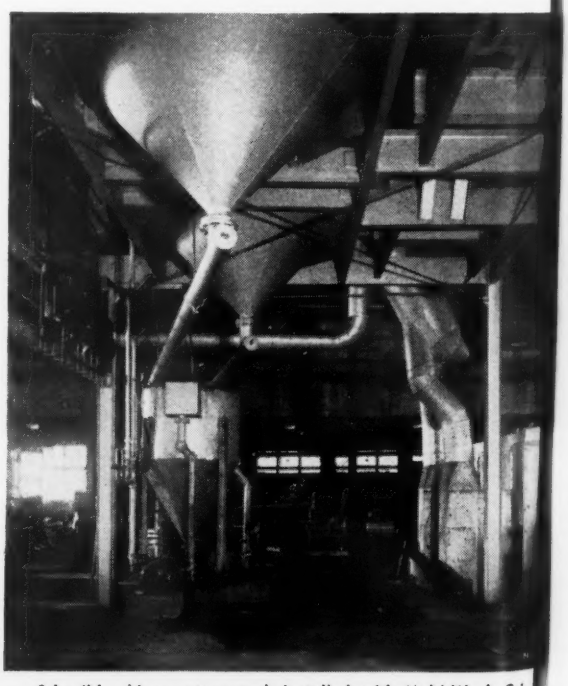
P. O. Box 81, North End Station

Detroit 2, Michigan

SCHNEIBLE



Large concrete skimmer type tank for handling collected material from all operations in a large production foundry. Note clamshell removing dewatered residue. Water in right side is in the process of being clarified for recirculation back through the collectors.



Schneible skimmer type tank installed with Multi-Wash Collectors. These tanks retain the collected material in a semi-liquid state for pumping to disposal point or process.

NEW MOVIE AVAILABLE

FOR YOUR ENTERTAINMENT: A NEW, FULL COLOR 16MM MO of modern production foundry operation entitled: "THE INVIS SHIELD." Available upon request. Please advise exact date wish to show it and date you will return, so we can schedu meet your program. *Educational and informative for groups intere foundry work.*

Late Foundry News

July 29, 1953

MORE FOUNDRIES: Number of foundries in the United States increased by 88 the last two years to a total of 5387. Canada's foundry population dropped 17 to 551. These figures are disclosed in *Foundry's* biennial study of the foundry industry just completed for incorporation in the forthcoming edition of *Penton's Foundry List.*

Biggest gain in number of foundries was shown by California—up 60 to 481— to boost that state to third place in national ranking. That spot formerly was occupied by Illinois, which still remains ahead of New York, Michigan and Wisconsin. Ohio continues to have the largest number of foundries with 569, followed by Pennsylvania with 513. Further details on the foundry count will be presented in the September issue.

1954 CONVENTION: Exhibits Committee for the 1954 AFS Foundry Congress and Show met in Chicago, July 14, to start plans for the exhibit to be held in Cleveland, May 8-14 in connection with the annual convention. The Foundry Show is scheduled to open on Saturday, May 8, which will be designated as "Northeastern Ohio Day" for personnel of foundries and allied industries of the area. Special admission passes for that day will be distributed by the Northeastern Ohio Chapter of AFS with the co-operation of foundries in the chapter area.

CENTRAL FOUNDRY TO BUILD: A 200,000-sq-ft addition to its Defiance, O., foundry is planned by Central Foundry Division of General Motors Corp. This will bring the enlarged facilities to about 570,000 sq ft. It also is planned to increase the work force from 2000 to 2800.

PLANT EXPANSION: Certificates of necessity for accelerated tax amortization for new or expanded facilities, and amounts involved, have been issued to these foundries: Superior Steel & Malleable Castings Co., Benton Harbor, Mich., $65,115; Janney Cylinder Co., Philadelphia, $21,236; American Manganese Bronze Co., Philadelphia, $13,000; Buckeye Steel Casting Co., Columbus, O., $135,000; Bonney-Floyd Co., Columbus, O., $40,000; Warren Foundry & Pipe Corp., Phillipsburg, N. J., $837,000. A certificate granted Osborn Mfg. Co., Cleveland, foundry equipment manufacturer, involves $492,744.

MAX KUNIANSKY DIES: One of the country's best known foundrymen, Max Kuniansky, executive vice president of Lynchburg Foundry Co., Lynchburg, Va., died there unexpectedly, July 21. He was 54. Mr. Kuniansky was a past president of the American Foundrymen's Society, which awarded him its William H. McFadden Gold Medal in 1941. He had been with Lynchburg Foundry Co. since 1923.

RECOGNITION: Progress is being made in securing greater recognition for the foundry industry and castings in Washington. Within the past few weeks, a task force of the Non-Ferrous Founders' Society and representatives of the ferrous foundry industry have met with ranking executives of the Department of Commerce to present recommendations. Both groups report that the government officials were receptive to the ideas presented.

NICKEL STILL CONTROLLED: Removal of allocation control over molybdenum, columbium-tantalum and cobalt by NPA leaves only nickel under complete control, including allocation. Melters and processors of nickel will continue to apply to NPA or its successor agency for monthly allocations, and nickel will be subject to use and inventory control as it has been since Aug. 15, 1951.

HONORED: City of Detroit on July 21 honored Clement J. Freund, who is marking his 20th anniversary as dean of the University of Detroit Engineering College, with presentation of a copy of a city council resolution expressing "the appreciation of the entire community for his contribution to the industrial growth and progress of our community."

EXPENDITURES HOLD: Spending for new plants and equipment in the third quarter will total $7.1 billion, according to a joint survey by the Department of Commerce and the Securities and Exchange Commission. This would bring the total for the first nine months to $20.5 billion, 7 per cent ahead of the 1952 period. Biggest gain over last year is being shown by public utilities.

CAST FORGINGS: Air Force officers, in their constant search for metal airframe parts of minimum weight and top physicals, are examining the potentialities of a possible merger of the casting and forging techniques. This concept is based on the fact that a certain amount of working raises the physicals, but excessive work induces fatigue.

Excessive working induces fatigue particularly

in the metals which normally have large grain structure — notably magnesium, aluminum and titanium. The proposal calls for using castings as the blanks in the forging operation. By starting out with castings of the desired shape and dimensions, the need for excessive working to fill the closed forging dies would be eliminated.

CHANGES NAME: Carbon Malleable Casting Co. Inc., Lancaster, Pa., has changed its name to Pennsylvania Malleable Iron Corp., effective July 1. The change has no effect on the company's organization, policies or personnel. Since 1948 the company has been conducting an expansion program involving expenditure of $250,000 on buildings and equipment.

METAL ALLOTMENTS: Quantities of steel, copper and aluminum ordered by the ODM to be reserved at the mill level for defense orders during the fourth quarter are moderately lower than third quarter allotments. They include 1,837,803 tons of steel, down 20 per cent; 217,497,000 pounds of copper and copper-base alloy products, down 11 per cent, and 203,595,000 pounds of aluminum, down 9 per cent.

MATERIALS HANDLING: A new 42-page booklet, "Improving Materials Handling in Small Plants," has been prepared by the Small Defense Plants Administration and is available for 20 cents from the Superintendent of Documents, Government Printing Office, Washington 25.

MISCELLANY: United States Pipe & Foundry Co. has moved its general offices from Burlington, N. J., to 3300 First Ave. N., Birmingham, and has consolidated its Sloss-Sheffield Iron & Steel Division with the general office departments there, no longer operating it as a separate division . . . Powdered Metal Products Corp. of America, Franklin Park, Ill., shell mold machine manufacturer, has been acquired by Yale & Towne Mfg. Co. . . .Fire destroyed a pattern storage warehouse of Lindgren Foundry Co., Batavia, Ill., June 17, with loss estimated at $1 million or more . . . L. M. Gowin Mfg. Co., Middletown, Conn., die casting manufacturer, plans to more than double its production facilities . . . Cleveland Metal Abrasive Co. is doubling its production of cut wire shot with establishment of a plant, to be known as its Cut Wire Division, at Northfield, O.

PRICES OF FOUNDRY METALS AND COKE

(As of July 29, 1953)

FOUNDRY COKE

(Per net ton, f.o.b. ovens)

BEEHIVE	
Connellsville	$16.50-17.00
New River	20.80
Wise County	15.95
OVEN	
Birmingham	$21.65
Chicago	24.50
Detroit	25.50
Erie, Pa.	25.00
Everett, Mass.	26.00
Indianapolis	24.25
Kearney, N. J.	24.00
Milwaukee	25.25
New Haven, Conn.	23.45
Painesville, O.	25.50
Philadelphia	23.95
Portsmouth, O.	24.00
St. Louis	26.00
St. Paul	23.75
Swedeland, Pa.	23.85
Terre Haute, Ind.	24.05

PIG IRON

	(Per gross ton f.o.b. furnace) No. 2 Foundry	Malleable
Bethlehem, Pa.	$58.50	$59.00
Birmingham	52.88	....
Buffalo	56.50	57.00
Chicago	56.50	56.50
Cleveland	56.50	56.50
Everett, Mass.	63.25	63.75
Fontana, Calif.	62.50	....
Geneva, Utah	58.00	....
Granite City, Ill.	58.40	58.90
Lone Star, Tex.	52.50	52.50
Neville Island (Pittsburgh)	56.50	56.50
Steelton, Pa.	58.50	59.00
Swedeland, Pa.	60.50	61.00
Toledo, O.	56.50	56.50
Troy, N. Y.	58.50	59.00
Youngstown, O.	56.50	56.50

NONFERROUS INGOT

BRASS AND BRONZE: 85-5-5-5 —26.00c; 88-10-2—34.75c; 80-10-10 — 30.00c; No. 1 yellow — 21.25c.

ALUMINUM: 99 per cent plus, primary ingots 20.50-21.50c. Secondary No. 12 alloy 22.00-23.00c. Deoxidizing grades: No. 1 23.75-24.00c; No. 4 21.00-22.00c.

MAGNESIUM: 99.8 per cent standard ingots 27.00c, f.o.b. Freeport, Tex.

COPPER: Electrolytic 29.75-30.00c, Connecticut valley.

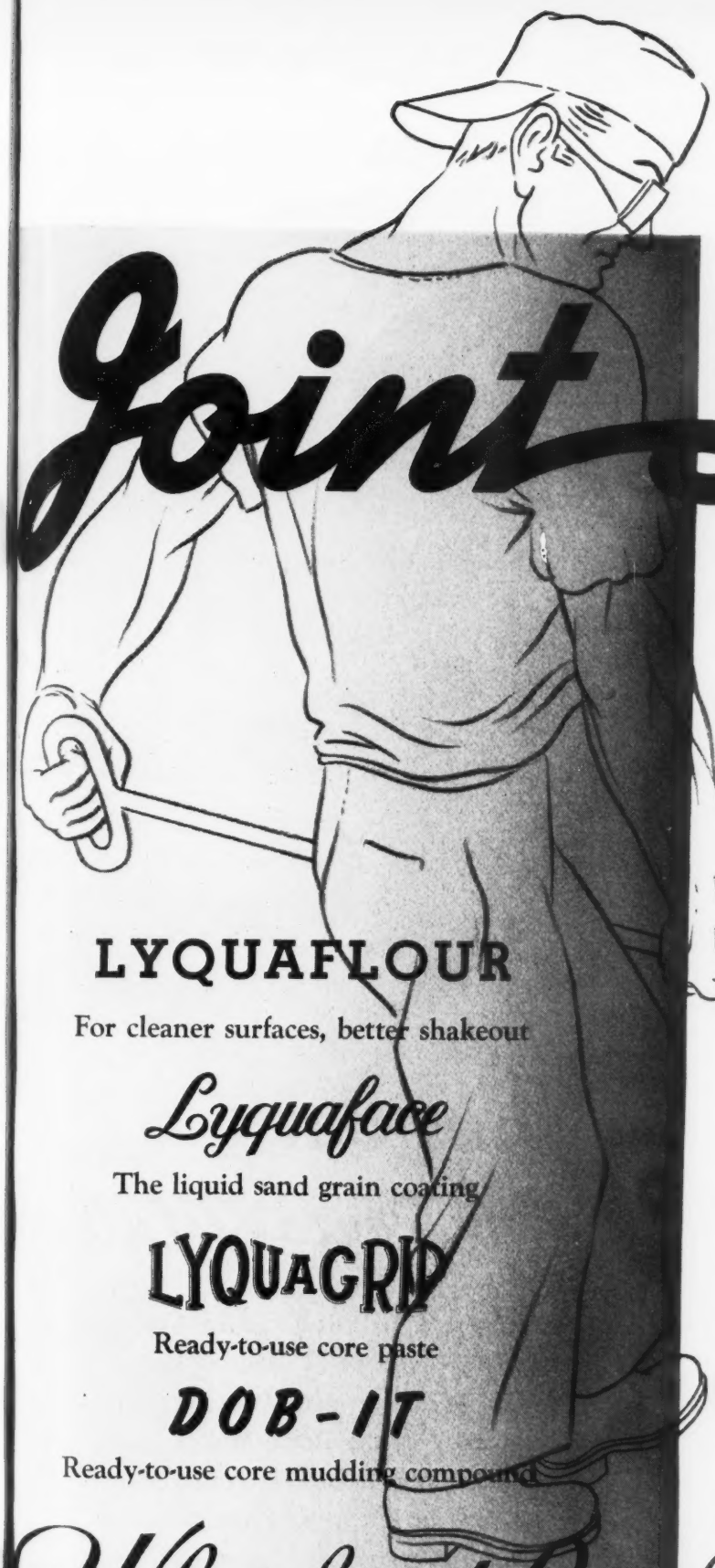
ZINC: High grade 12.35-12.85c, delivered. Die casting alloy 15.75c, delivered.

IRON AND STEEL SCRAP

(Consumer prices per gross ton delivered, except as otherwise noted)

	No. 1 Heavy Melting Steel	No. 1 Cupola Cast	Heavy Breakable Cast	Clean Auto Cast	Machinery Cast	Malleable	Short Steel Rails
Birmingham	$31.00-32.00	**$39.00-40.00	**$30.00-31.00	.....	.....	.....	$45.00-46.00
Boston*	**33.00-34.00	**30.00-31.00	.....	.....	**38.00-39.00	.....	.....
Buffalo	43.50-44.00	**40.00-41.00	.....	.....	44.00-45.00	.....	53.50-54.00
Chicago	41.00-42.00	40.00-42.00	.....	45.00-47.00	45.00-47.00	43.00-45.00	53.00-56.00
Cincinnati	44.00	45.00	40.00	.....	50.00	47.00	55.00
Cleveland	45.00-46.00	45.00-46.00	38.00-39.00	46.00-47.00	49.00-50.00	49.00-50.00	52.00-56.50
Detroit	34.00-35.00	43.00	29.00-30.00	42.00-43.00	.....	44.00	.....
Los Angeles	24.00	38.00-40.00	.....	.....	.....	.....	.....
New York*	37.00-37.50	32.00-34.00	.....	.....	.....	.....	.....
Philadelphia	44.00-44.50	38.00-39.00	43.00	.....	47.00-48.00	.....	.....
Pittsburgh	44.00-45.00	43.00-44.00	40.00-41.00	.....	49.00-50.00	.....	53.00-55.00
St. Louis*	41.00-42.00	41.00-42.00	36.00-38.00	44.00	.....	36.00	53.00-55.00
San Francisco	28.00	39.00	45.00	52.00	52.00	55.00	42.00-45.00
Seattle	31.00	**30.00-35.00	**30.00-35.00	.....	.....	.....	.....

* Brokers' buying prices. ** F.o.b. shipping point.

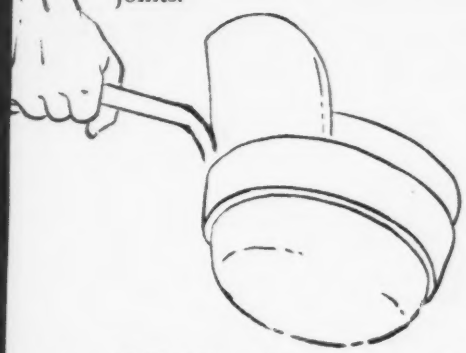


Established 1841

Joint Seal

The time saving, labor saving plastic compound for perfect sealing.

1. **JOINT SEAL** reduces casting cleaning time.
2. **JOINT SEAL** prevents run-outs, insures against thick fins.
3. **JOINT SEAL** gives a complete seal on dry sand molds.
4. **JOINT SEAL** *really* seals off core vents.
5. **JOINT SEAL** forms sealing gaskets for pouring basins and runner boxes.
6. **JOINT SEAL** seals down gate and sprue area on green sand molds.
7. **JOINT SEAL** seals misfit or burned flask joints.



8. **JOINT SEAL** eliminates the old soaking box; will not freeze.
9. **JOINT SEAL** can be applied by our special air gun.
10. **JOINT SEAL** is used for checking chaplet heights.
11. **JOINT SEAL** insures against leakers on pressure castings.
12. **JOINT SEAL** saves time, labor and storage space.

You owe it to yourself to investigate our claims.

LYQUAFLOUR

For cleaner surfaces, better shakeout

Lyquaface

The liquid sand grain coating

LYQUAGRID

Ready-to-use core paste

DOB-IT

Ready-to-use core mudding compound

Whitehead Brothers Company

NEW YORK OFFICE
324 West 23rd St., New York 11, N. Y.

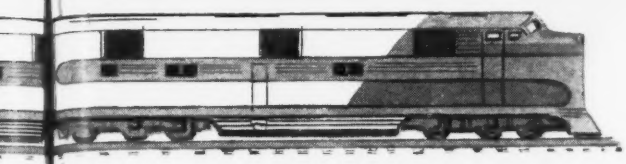
NEW ENGLAND OFFICE
17 Exchange Place, Providence 1, R. I.

There goes our 400th SIMPSON *Porto-Muller*®

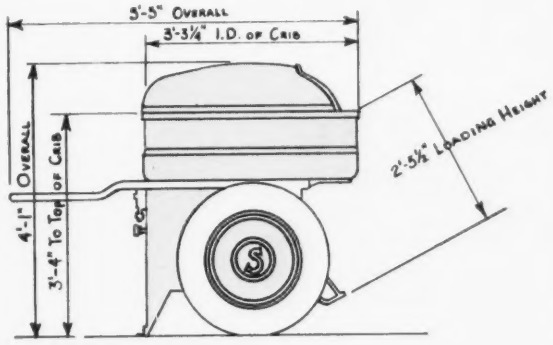
The low cost Simpson Porto-Muller was first introduced in April, 1949. Since that time, we have built *four hundred* of these versatile mixers, and have shipped them to foundries in every part of the country.

The ever-increasing use and acceptance of the Porto-Muller is a real testimonial to its value in providing experienced foundrymen with a fully portable and practical mixer for all types of foundry sand . . . from the slickest core sand mix to the toughest steel sand facing.

Check over the outstanding Porto-Muller features and proof of acceptance on the opposite page—and then have a National Engineer show you how this versatile muller can increase production and casting quality at lower cost.



here are a few reasons for the *Porto-Muller's* popularity:



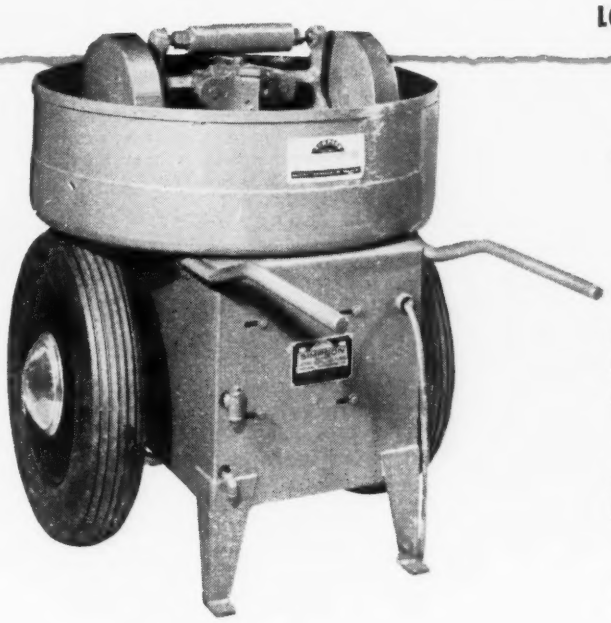
100% PORTABLE . . . *Completely self-contained — no auxiliary hoists or ceiling supports needed.*

BIG CAPACITY . . . . *Easily handles 250 to 300 lbs. of sand.*

READY TO GO . . . *Fully equipped with dust hood, motor starter, electric cable — plug into outlet and you're mulling.*

ADJUSTABLE MULLERS . . . *Spring adjustment pre-loads mullers within a range of 100 to 275 lbs., to provide correct muller weight for all types of sand.*

LOW COST — PROMPT DELIVERY



. . . and here's what typical *Porto-Muller* users have to say . . .

"reduced our casting losses with sand prepared by this machine . . . have increased production and produced smoother castings"
(Gray Iron Foundry, Pennsylvania)

"saving at least 50% on labor and 25% to 50% on core oil . . . getting smooth and better cores"
(Brass Foundry, Michigan)

"saving about 50% of labor cost . . . also reduced binder about 50%"
(Iron Manufacturer, Kansas)

"previously took 4 man-hours to mix 5 wheelbarrows of sand — with Porto-Muller, now takes one man 45 minutes . . . also use about ½ the amount of oil and water, with better results"
(Bronze and Aluminum Foundry, Illinois)

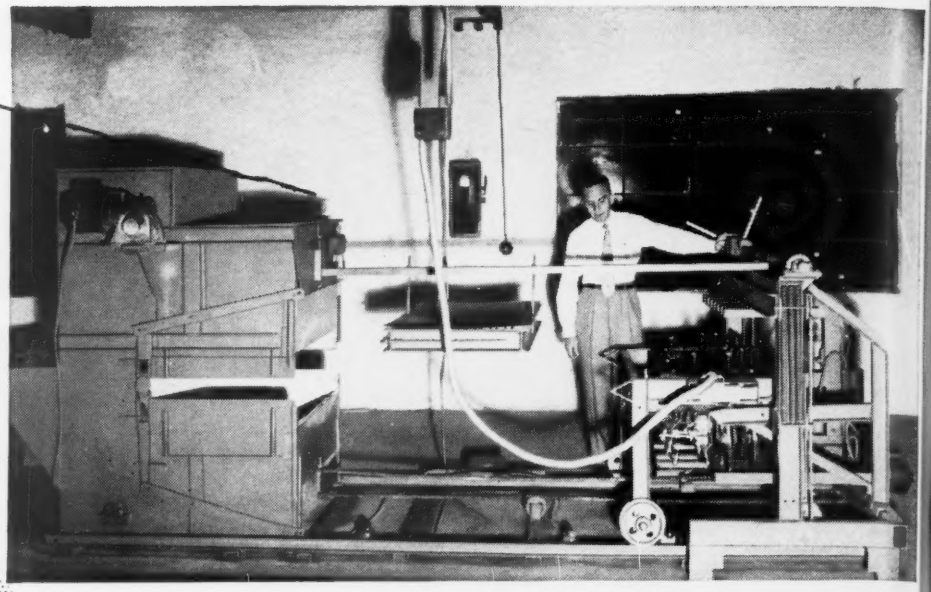
Write for Bulletin 492

National Engineering Company
(Not Inc.)
608 Machinery Hall Bldg. • Chicago 6, Illinois

SIMPSON *Intensive* MIX-MULLERS

Manufacturers and Selling Agents: For Continental European Countries — George Fisher, Ltd., Schaffhausen, Switzerland; for British Possessions — August's Limited, Halifax, England; for Canada — Dominion Engineering Co., Ltd., Montreal; for Australia and New Zealand — Gibson, Battle & Co., Pty., Ltd., Sydney, for Argentina, Brazil and Uruguay — Equipamentos Industriais EISA Ltda., Sao Paulo, Brazil; for Mexico — CASCO ,S. De R.L., Mexico, D.F.

STEP UP SHELL MOLDING DEPENDABILITY

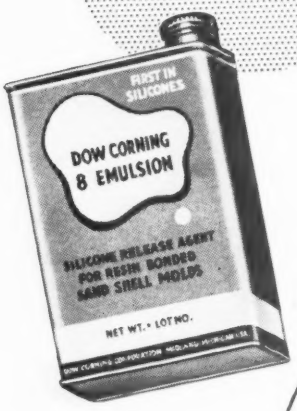


President C. E. Kohlhase of the Southern Shell Mold Equipment Co., Chattanooga, Tennessee, at the carrier control of their new semi-automatic machine. Especially adapted to both experimental and production work, the machine mounts an integrally heated pattern on a rolling platform. The pattern is coated with sand resin mix in the investment chamber at left. Excess mix is returned to the upper hopper by an automatic conveyor. After a curing period under the electric radiant heater, center, the platform rolls to a manual shell ejector, right. The pattern is flipped over and the shell removed. Parting agent is sprayed on automatically, the pattern is righted, and the platform returns to its starting position for another cycle. Capacity ranges up to sixty 20" x 30" x 7" shells per hour.

with

DOW CORNING 8 EMULSION

...the NEW Silicone Parting Agent that helps assure Fast, Continuous Production of Shell Molds and Cores at Low Cost.



Easy release is the key to maximum production of more dependably accurate shell molds at minimum cost. And that's just what you get when you use the new Dow Corning 8 Emulsion.

Especially designed for the shell process, Dow Corning 8 Emulsion costs less, goes further and gives positive release from even the most complex patterns. More effective at lower concentrations than any previous material, it gives you even less build-up on pattern surfaces. Dimensional accuracy is retained through longer runs; pattern-cleaning costs are substantially reduced; "stickers" can be completely eliminated.

Easily diluted with hard or soft water, Dow Corning 8 Emulsion is nonflammable, noncorrosive and highly resistant to creaming or separating in storage or after dilution. And it is available at a new low price, 8% below that of previous emulsions. For more information and a free trial sample, fill in and mail this coupon today.

Send for sample TODAY

DOW CORNING CORPORATION, Dept AH-8
Midland, Mich.

Please send me
- ☐ Free sample of Dow Corning 8 Emulsion
- ☐ Data on Silicone Release Agents for the Shell Process

Name _____

Company _____

Street _____

City _____ Zone ___ State _____

DOW CORNING DOW CORNING SILICONES **CORPORATION**
MIDLAND MICHIGAN

ATLANTA CHICAGO CLEVELAND DALLAS DETROIT LOS ANGELES NEW YORK WASHINGTON, D. C. (Silver Spring, Md.)

In Canada: Fiberglas Canada Ltd., Toronto In Great Britain: Midland Silicones Ltd., London

but it's worth it to get those BUFFALO PATTERNS"

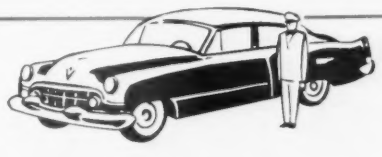
Most of us hate to leave our families, but business is business, and the foundry men who are handling the big business know why it pays to always use Buffalo Patterns.

Here they find a *new* kind of Engineering service that accurately plans *every* detail of *every* job. Coupled with this is the old fashioned kind of Fine Craftsmanship that refuses to ever turn out a mediocre job. What does this mean to you? Well, it means just this: When a Buffalo equipment is installed at your plant, there is *never* any adapting or extra rigging to do. You'll find that your Buffalo Patterns will fit your foundry and your production schedules like magic. In addition . . . your scrap ratio will drop to an all time low.

That's why more and more profit-minded pattern buyers are looking to Buffalo for *better* patterns for their *better* jobs. Why don't you?

BE OUR GUEST

Just let us know when you are coming to Buffalo on pattern business. One of our cars will meet you at your plane or train and transport you to our club where you will be our guest during your stay.



Production and Experimental Pattern Equipment • Plastic and Wood Models, Precision Parts, Jigs and Templates • Shell Mold Pattern Equipment • Permanent Molds for Foundries, Injection Plastics and Reinforced Plastics • Engineering Drawings • Forging Dies • Non-Ferrous Castings • Shell Mold Castings • Metallizing

BUFFALO PATTERN WORKS, INC. • **832 HERTEL AVE., BUFFALO 16, N. Y.**

DESIGNERS AND MANUFACTURERS OF PATTERN EQUIPMENT FOR OVER HALF A CENTURY

Furnace linings last longer

when they are made of Norton-engineered Special Refractories

Fewer shut-downs and more continuous operation is always the story when linings are made of Special Refractories engineered to your job by Norton. Whether you are melting ferrous or nonferrous metals there are Norton mixtures for a wide variety of successful applications that mean more metal melted per lining, fewer furnace shut-downs and generally lower costs.

There are so many complications in metal melting, involving chemical, electrical and physical conditions it will pay you to take advantage of Norton's 40 years' experience in solving Special Refractory problems like yours.

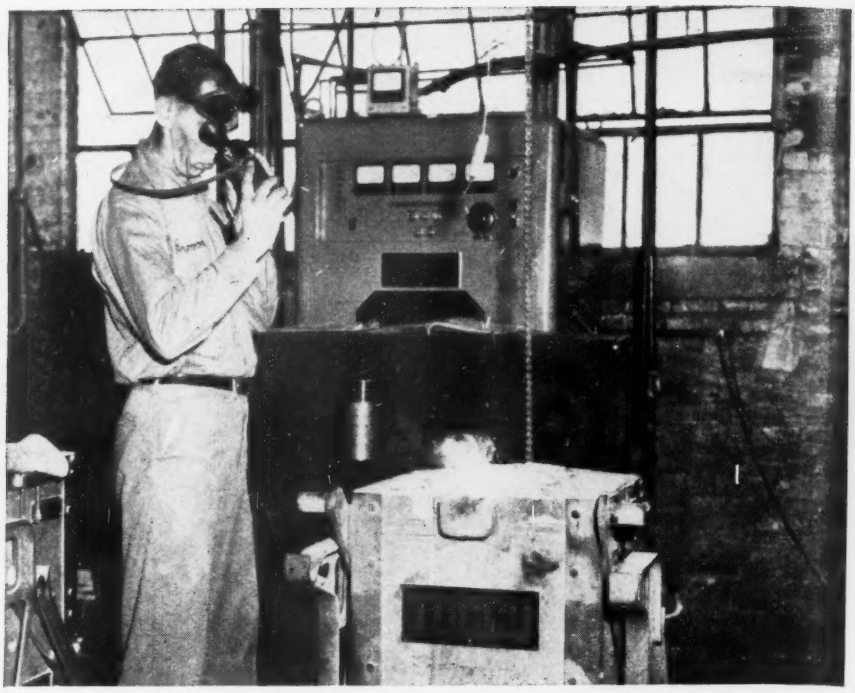
Many different materials

Norton furnishes Special Refractory grain, cements and bonded shapes in a wide variety of mixtures each engineered for a particular set of conditions.

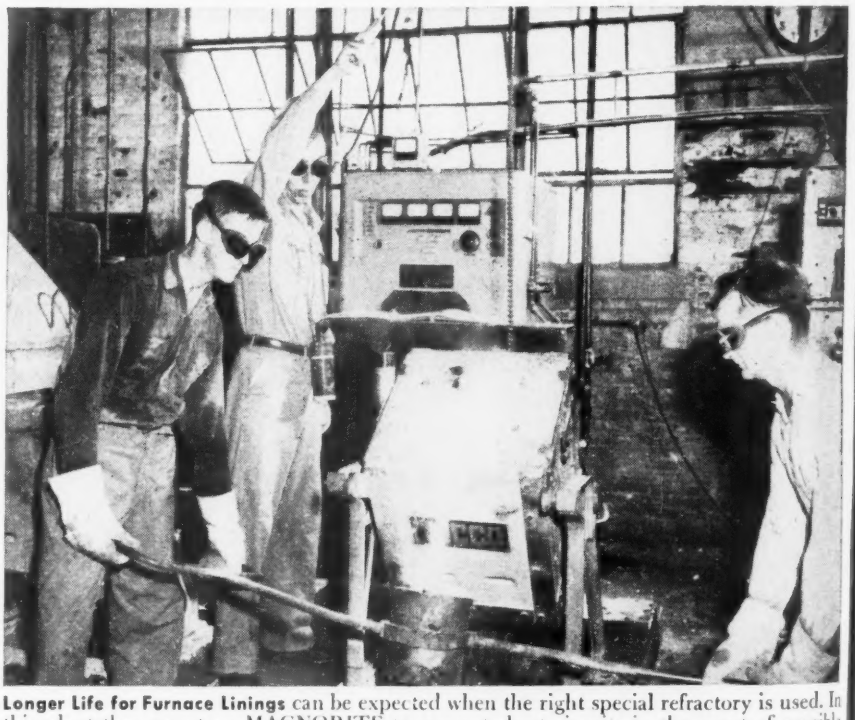
Such special Refractory Materials as CRYSTOLON* (silicon carbide), ALUNDUM*, FUSED STABILIZED ZIRCONIA.

What is your problem?

We believe you will benefit by consulting your nearby NORTON Representative or writing Norton Company, 307 New Bond Street, Worcester 6, Mass. *Canadian Representative:* A. P. Green Fire Brick Co., Ltd., Toronto, Ontario.



Taking the Temperature reading on the melt at the Metalmold Corporation plant at Groton, Mass. Temperatures go 3200° F. and higher. MAGNORITE* grain placed between the crucible and the coil has such high rammed density that it offers great resistance to penetration, erosion and chemical attack.



Longer Life for Furnace Linings can be expected when the right special refractory is used. In this plant they count on MAGNORITE to prevent short circuits in the event of crucible breakage. MAGNORITE keeps metal from reaching the primary coil of the furnace.

*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries

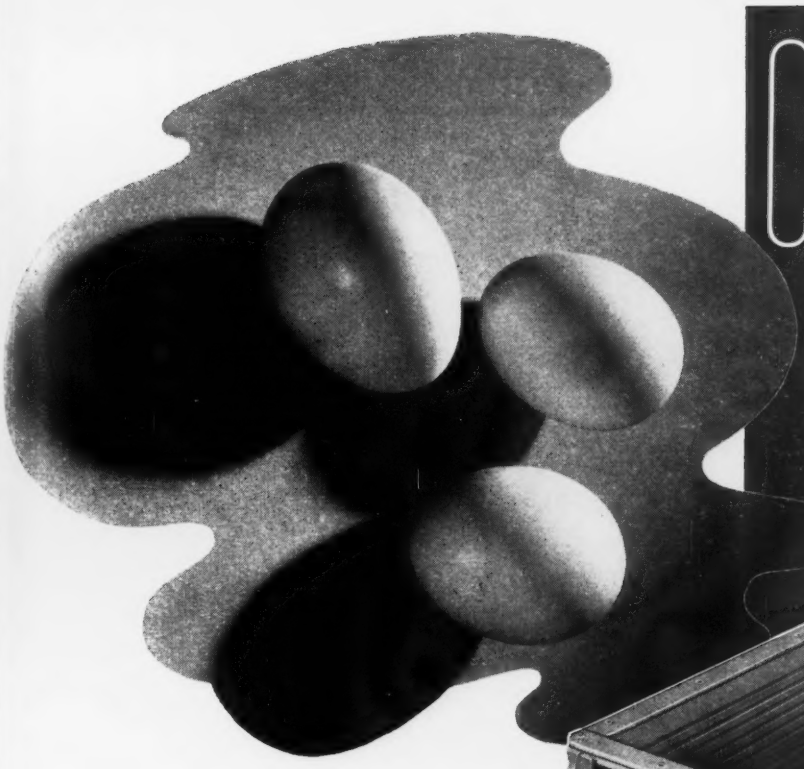
NORTON

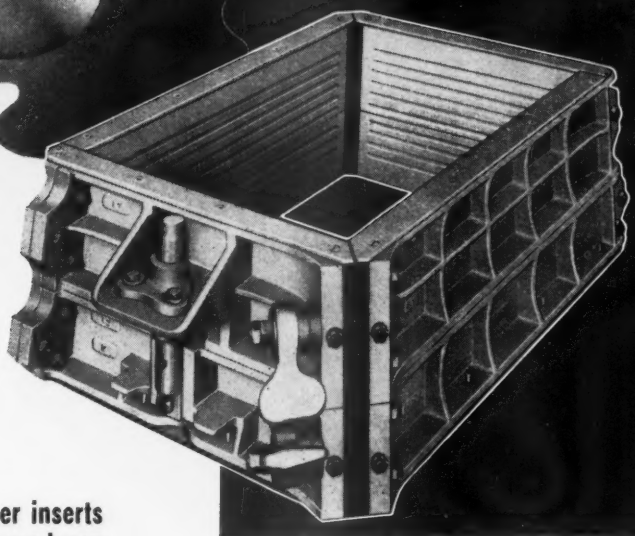
Special REFRACTORIES

Making better products to make other products better

NORTON COMPANY, WORCESTER 6, MASSACHUSETTS

COMPLETELY CLOSED





Long-life, easily replaceable, live rubber corner inserts completely close the corner gaps so that no sand can lodge in the open corners of the new

FREMONT SPREADLOCK FLASK

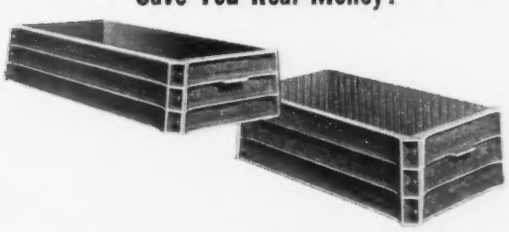
The accurately machined inside surface and flanges, and steel-faced top and bottom flanges assure more exacting work. Magnesium has twice the tensile strength of aluminum — which means longer service — and magnesium weighs ⅓ less than aluminum — which means easier handling.

Write today for free literature and prices on Fremont Spreadlock Flasks, Fremont Standard Slip Flasks (with the GROOV-LOCK FOOLPROOF PIN) and Fremont Cast Iron or Cast Aluminum Jackets (which permit easy insertion of new sides and ends).

All orders given prompt attention.

FREMONT CAST IRON OR CAST ALUMINUM JACKETS

Save You Real Money!



Precision machined and drilled, bolted corner construction permits easy insertion of new sides or ends. The entire jacket need not be scrapped. Standard style for ordinary foundry practice. Grooved style, which permits ready gas escape, for steel foundries. Flasks and jackets can be assembled on 3°, 4°, or 5° taper.

THE FREMONT FLASK COMPANY

Fremont, Ohio

Iron foundry doubles output with no extra manpower

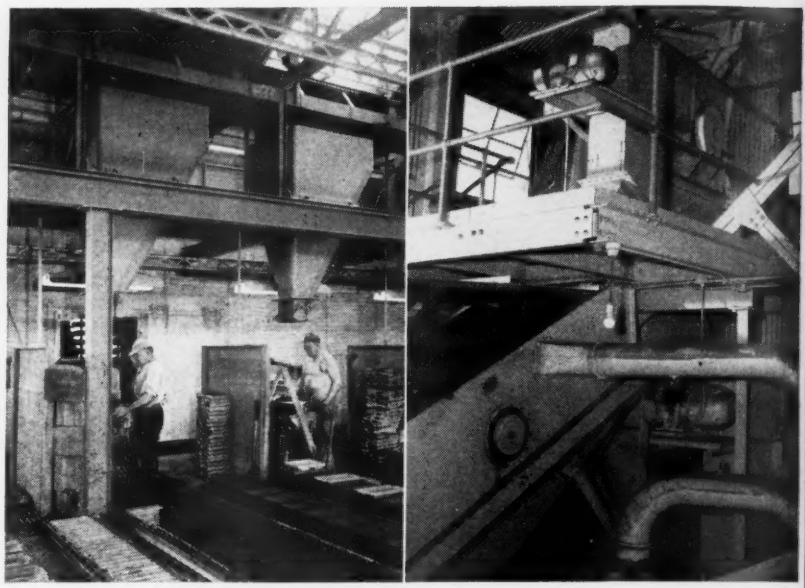
American Hardware also has LINK-BELT mechanize sand handling in its brass foundry

RECENTLY, the American Hardware Corp. modernized one-half of their New Britain (Conn.) iron foundry, producing building hardware products for their P & F Corbin, Russell & Erwin, and Corbin Cabinet Lock divisions. This conversion provided a unique chance to compare mechanized and hand-labor methods. The converted half, with its Link-Belt sand handling and reconditioning system, has doubled production with no increase in manpower.

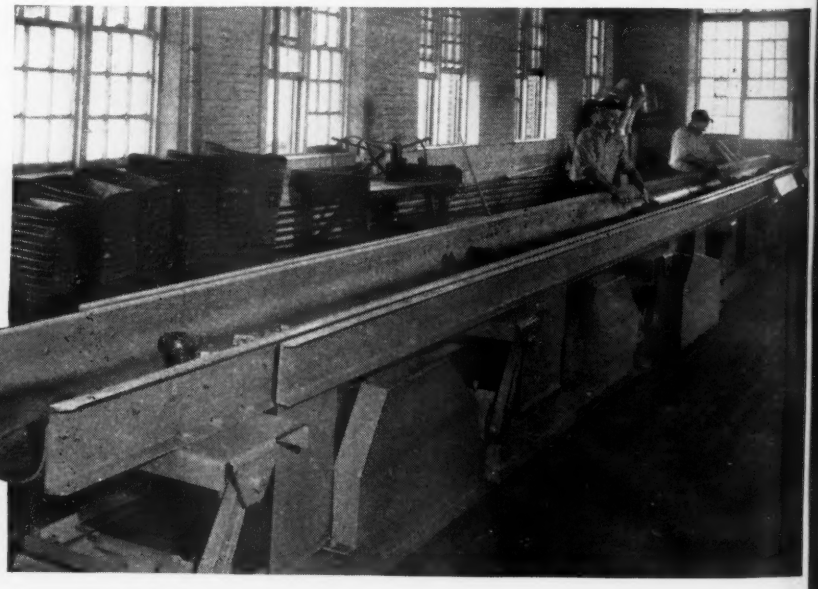
Later a 70-ft., Positive Action Link-Belt Oscillating Conveyor was added to sprue castings from gates. Result: handling costs cut more than 50%.

Naturally, when the American Hardware Corp. management decided to mechanize their brass foundry, Link-Belt sand handling and reconditioning equipment was chosen. And again, better working conditions, lower costs and improved casting quality are the result.

Link-Belt's engineering experience and efficient foundry equipment can provide equally striking benefits for you. Our engineers will work hand-in-hand with you and your consultants.



Link-Belt belt conveyors distribute sand to molders' hoppers, recover spillage as it falls through grates. Shakeout and spill sand is delivered to Link-Belt vibrating screen by bucket elevator shown in background.



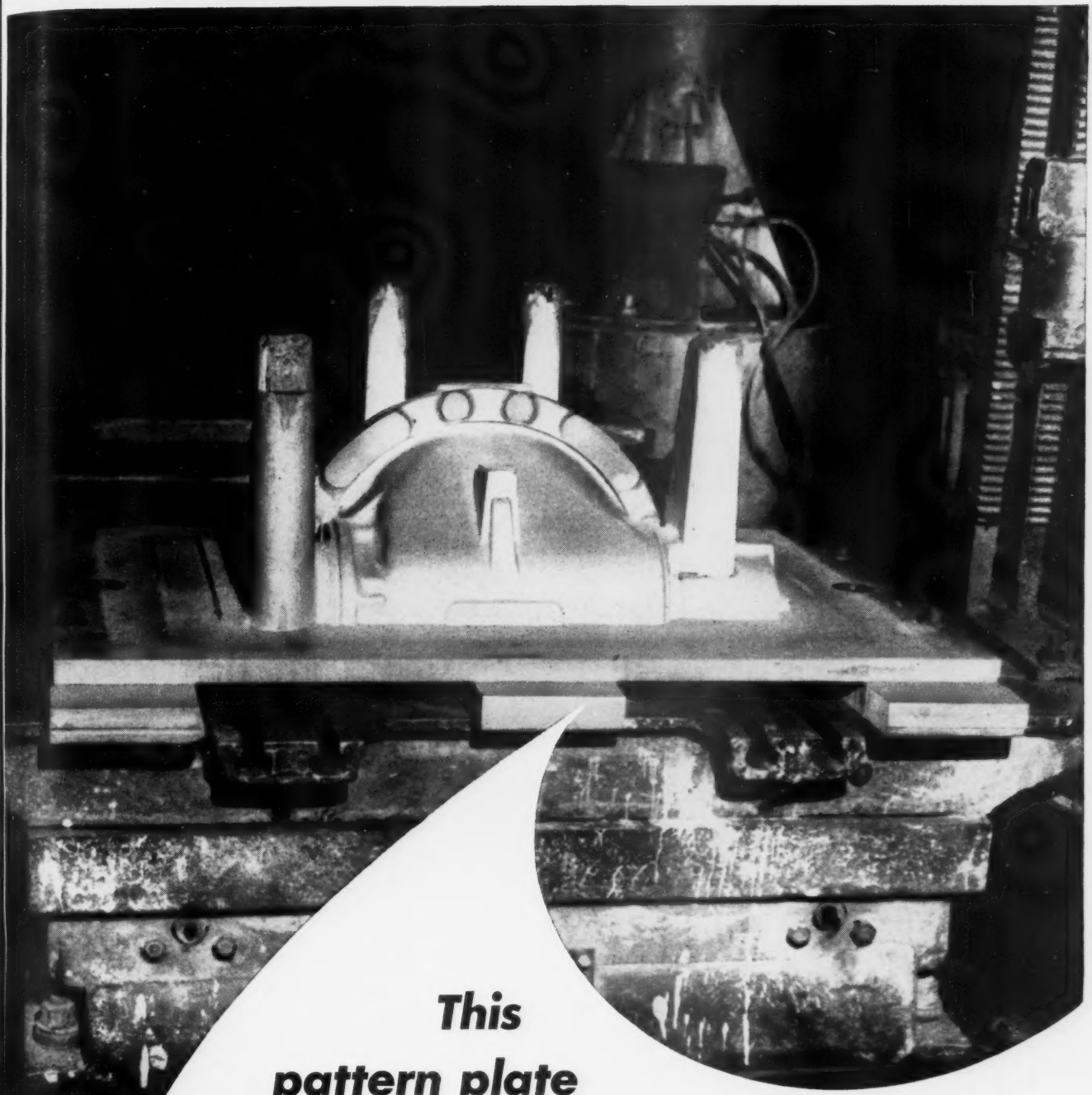
Link-Belt Oscillating Conveyor, spring-mounted to minimize floor vibration, discharges sprued iron castings to tote boxes. Note how effectively perforated section screens out molding sand shaken loose from castings (inset).

LINK-BELT

CONVEYORS and PREPARATION MACHINERY

MEMBER FEMA

LINK-BELT COMPANY: Plants: Chicago, Indianapolis, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle, Toronto, Springs (South Africa), Sydney (Australia). Sales Offices in Principal Cities. 13,262



This pattern plate is aluminum

(Alcoa Aluminum Tool & Jig Plate) because aluminum is light—easy to handle. It also costs substantially less than if it were made of steel because material costs are lower and machining is faster.

Alcoa casts Tool & Jig Plate in thicknesses from ⅜″ to 4″—and in dimensions up to 48″ x 96″. It is normalized and available from stock . . . machined on both sides. For full information on Alcoa Tool & Jig Plate, contact your local Alcoa sales office . . . or write Aluminum Company of America, 1949-H Alcoa Building, Pittsburgh 19, Pa.

Alcoa Aluminum

ALUMINUM COMPANY OF AMERICA

Tailormade!

for longer, faster, more economical portable grinding of welds and casting

Sterling offers a wide choice of abrasive shapes and sizes for the quick solution of your weld and casting grinding problems. Here is a complete line of abrasive items, especially designed to reach any recess or remove fins, parting lines, and various defects.

Sterling also provides wheels of any desired diameter for a money-saving snagging job on castings of larger sizes.

Whether your problem is the grinding of large or small units, we can readily specify a pre-determined wheel formula in an almost limitless range of abrasive items ranging from small, mounted points with detachable spindles (a special Sterling feature) and properly shaped cones to large wheels for casting and billet grinding.

There is no limit to the application of Sterling's "Wheels of Industry" . . . write us today and an abrasive engineer will contact you at once. No obligation!

Free! For Your Files!

Send today for this complete file of literature giving full information on proper wheels to use for regular or special grinding. This free information will be sent immediately upon request.

THE STERLING ABRASIVES

OF THE CLEVELAND ABRASIVE COMPANY

BRANCHES . . BOSTON — CHICAGO — CLEVELAND — DETROIT — LOS ANGELES

DIVISION • GRINDING WHEEL INSTITUTE MEMBER • TIFFIN, OHIO

QUARRIES COMPANY

OS ANGELES — NEW YORK — DISTRIBUTORS IN ALL PRINCIPAL CITIES

We Can Help You Build Your Warehouse or Sales Office in Central BIRMINGHAM

to Serve the South

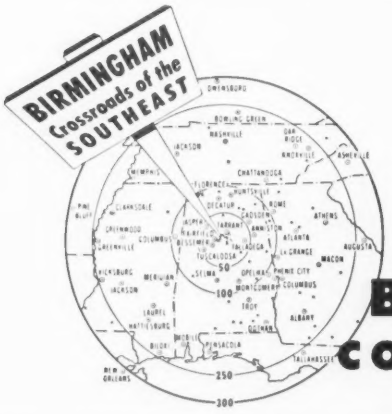
Birmingham—geographic and distribution center of the South—is the logical location for serving Southern markets. From Birmingham the average distance to other major buying centers in the Southern states is shorter than from any other city in this region. This means shorter hauls, faster shipments, substantial freight rate savings. This is why so many companies have placed warehouses and sales offices here. If you are planning to do likewise but do not wish to invest capital in a building, our Committee can help you.

As an illustration of what will be done by landlords and realtors to assist, we cite the activities of Birmingham Realty Company. This large realty holding company is a successor to the Elyton Land Company, which founded Birmingham. It owns a substantial amount of lands available for development. It has made long-term land leases and constructed buildings on its own properties for many enterprises, and will negotiate through responsible real estate firms for the development of its properties to be occupied by established businesses or manufacturers.

Pictured are the modern warehouse of the Frigidaire Sales Corporation and the office of the General Motors Acceptance Corporation erected by Birmingham Realty Company.

Among the firms for which it has built warehouses or sales offices on close-in or outlying sites are: Frigidaire Sales Corporation, General Electric Company, General Motors Acceptance Corporation, Ingersoll Rand Company, White Motor Company, Sears Roebuck Company, Standard Brands Incorporated, Renard Linoleum & Rug Company, Ward Baking Company.

Birmingham has many substantial real estate firms which are thoroughly experienced in all phases of constructing and financing offices, warehouses, etc. All of these firms cooperate with those who wish to take advantage of Birmingham's strategic location as the South's distribution center.



* * * * * *

The Birmingham Committee of 100 will work with you in finding a desirable location for your warehouse or sales office and arranging through local realtors for the erection of a building according to your specifications. Address inquiries to this Committee or any of its undersigned members.

BIRMINGHAM COMMITTEE OF 100

1914 Sixth Ave., N., Birmingham, Ala.

Executive Committee

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telling the story of 'dag' dispersions

Why You Should Use 'dag' Dry Film Mold Wash

Above all, you want a mold wash to prevent sticking. A **'dag'** dispersion of colloidal graphite does it best because it is a unique, friction-fighting material that forms a microscopically thin *dry lubricating film.* This film is more slippery than almost anything you can name.

'dag' dispersions can be applied by spraying, painting or dipping. Try them as parting compounds in sand, permanent-mold, and die casting . . . on molds, patterns, chills, cores, push pins, shoulder screws, flask pins, and ladle interiors. Parting will be quicker, castings smoother. Binding and stripping will be eliminated. Chills will tap off easily.

As an added benefit, water dispersions of **'dag'** colloidal products get rid of the irritating smoke caused by most parting compounds.

More information available free in our Bulletin No. 425-14H.

Dispersions of molybdenum disulfide are available in various carriers. We are also equipped to do custom dispersing of solids in a variety of vehicles.

dag DISPERSIONS

Acheson Colloids Company, Port Huron, Mich.

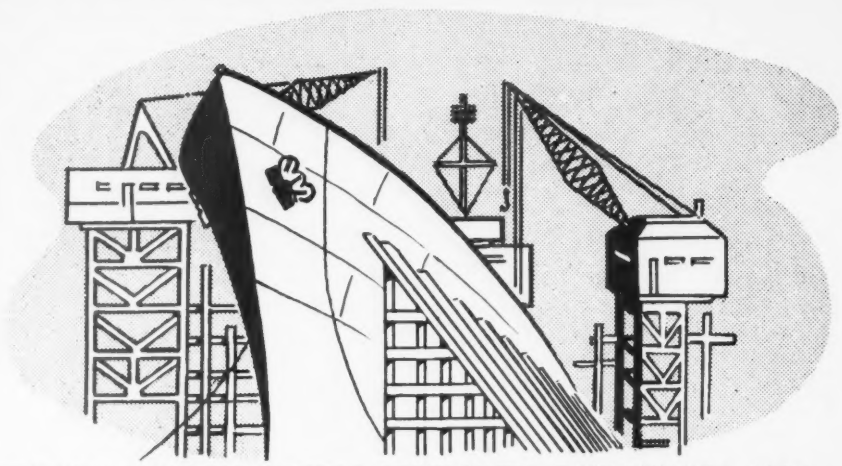
. . . also ACHESON COLLOIDS LIMITED, LONDON, ENGLAND

Units of Acheson Industries, Inc.

try 'dag' resin-bonded dry films for permanent lubrication

WHY **Silicon Bronze** CAN BETTER SERVE YOUR NEEDS . . . .

STRONG-DUCTILE **CORROSION RESISTANT**



SILICON BRONZE OFFERS STRENGTH, DURABILITY AND ATTRACTIVE FINISH IN THE "AS CAST" CONDITION.

Builders of high speed ships and modern marine equipment demand the finest metals available. Because of their high strength, ductility and excellent corrosion resistance, cast Silicon Bronzes meet all these requirements in the form of non-magnetic, non-sparking applications, pumps, special bushings, value parts, fasteners, brackets and structural parts.

The needs of many other industries are also admirably served through the superior properties of these copper-silicon and copper-silicon-zinc groups of casting alloys.

FREE . . . Write for your copy of the 8-page Lavingot Technical Journal — Vol. 9, No. 2 — containing an article discussing "Why Castings Are Lost."

Specify—LAVIN NONFERROUS INGOT—*Quality*

Brass · Aluminum · Bronze · Zinc Base Die · Casting Alloys

R. LAVIN & SONS, INC.

- *Refiners of Brass, Bronze and Aluminum*
- *Producers of Zinc Base Die Casting Alloys*

3426 S. KEDZIE AVENUE • CHICAGO 23, ILLINOIS

REPRESENTATIVES IN PRINCIPAL CITIES

R. LAVIN & SONS, INC. 1900 53 Years 1953 SERVING THE FOUNDRY INDUSTRY

Capacity Up
AS MUCH AS ONE-THIRD

Recent improvements in the *Foundromatic* sand core dryer now make this unit a better investment than ever.

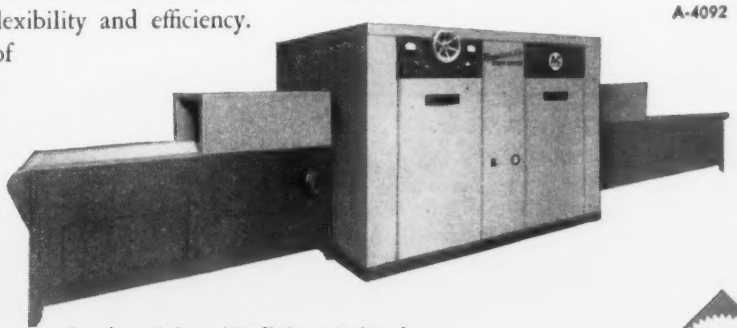
First, drying capacity is increased. For example, capacity of 25-kw units is increased from 1200 to 1600 pounds of sand per hour (at 3% moisture content).

In addition, generator section of new units is now built into oven section for compactness, flexibility and efficiency. Either heaters of larger capacity or additional heaters can be fitted into assembly as requirements for cores change. Other features are: fast core drying, good core finish, easy shakeout, and fuel savings up to 60%.

It will pay you to investigate *Foundromatic* sand core dryers right away, and get data on this *improved* model. It may change your plans.

Call your nearby A-C district office or write Allis-Chalmers, Milwaukee 1, Wisconsin.

A-4092



Foundromatic is an Allis-Chalmers trademark.

ALLIS-CHALMERS

QUESTIONS and ANSWERS
About Dielectric Sand Core Drying

1. Can cores made with different mixes and binders be dried at the same time?

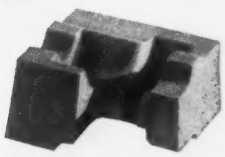
Yes. Photo at left illustrates this fact. Cores coming out of dryer were made with four different core mixes and two different binders. The same baking rate is used for all these cores. Therefore, they are all dried together.

2. How does the* Foundromatic *dryer save space?

It can bake cores as you need them. Since cores come out of dryer cool enough to use, there's no need to store them. Some foundries waste literally acres of shelf space for core storage.

3. What is a typical drying time for a core using the* Foundromatic *dryer?

This core is dried in the *Foundromatic* dryer in about 6 minutes. It used to take 70 minutes in a conventional oven.



4. How big a core can be dried in the* Foundromatic *dryer?

Cores up to 950 pounds are being dried successfully. Any core that will pass through an aperture 36 inches wide and 13 inches high can be dried.

SEND

Allis-Chalmers
Milwaukee 1, Wisconsin

Please send me specifications on the improved *Foundromatic* sand core dryer.

Name .....

Title .....

Company .....

Street .....

City ..... State A-4092

Although maligned in folklore as a bird of ill omen, and in comparatively recent times persecuted by farmers and hunters, it is now quite common knowledge that the owl is a valuable ally of the farmer. By night, it takes wing to do greater execution than scores of traps. Rats, mice, bats, grasshoppers, beetles and other insects make up its fare. From a purely economic standpoint, it would be difficult to name a more beneficial bird.

WISDOM

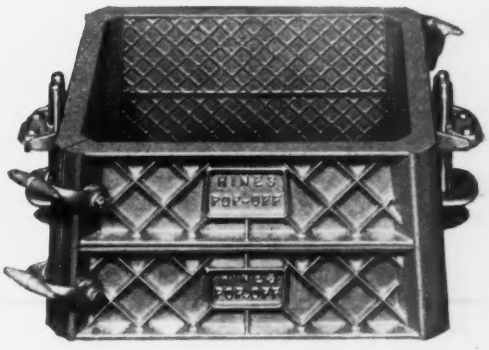
The owl's only claim to wisdom is based on ancient Grecian mythology, together with an attitude and mien suggestive of deep thought. Nevertheless, this solemn bird is generally regarded as the symbol of wisdom.

However, there's nothing mythical about the sound judgment that prompts the selection and use of HINES FLASKS. When it comes to choosing flasks for routine or difficult casting jobs, foundrymen demonstrate clear thinking by selecting HINES FLASKS. For there's no other foundry equipment in which they can invest that will pay them more substantial dividends.

So why not be smart? Next time you're in the market for flasks—be sure to investigate HINES FLASKS.

HINES FLASKS

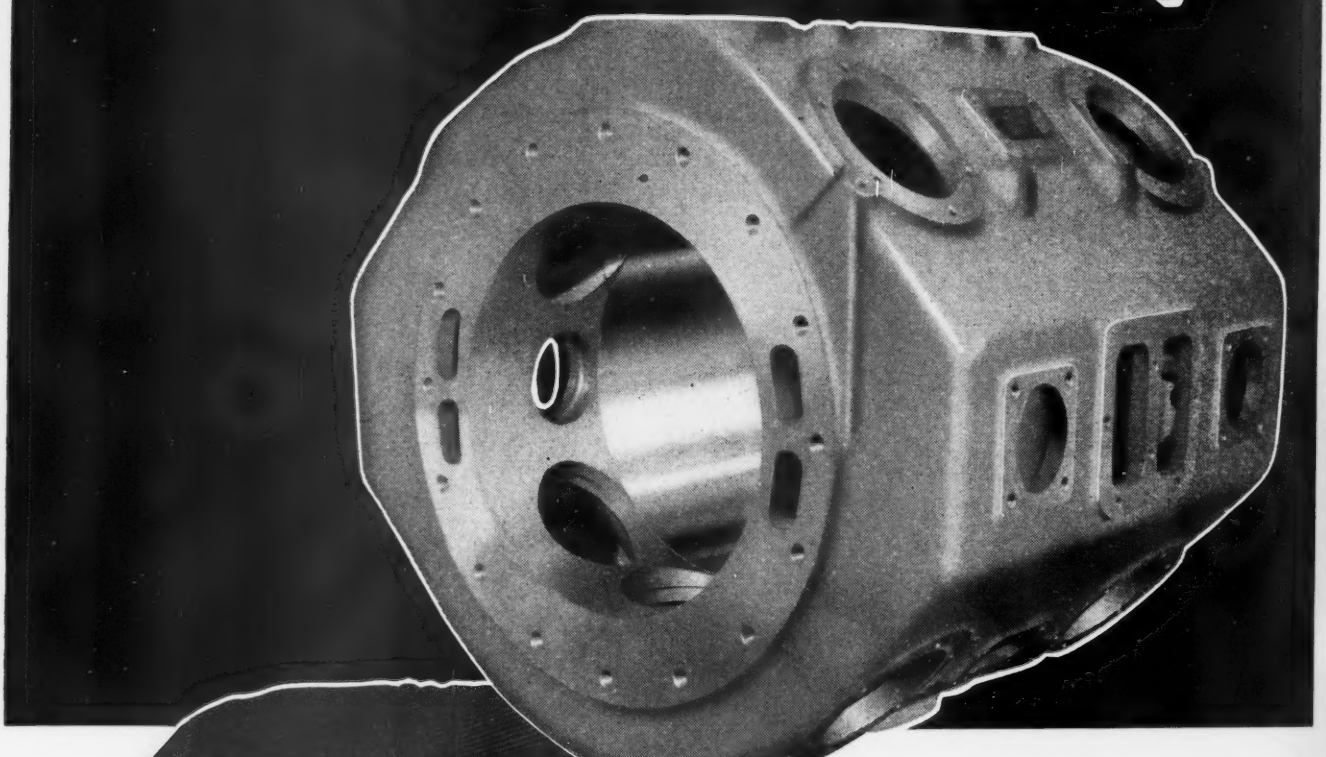
HINES POP-OFF FLASK

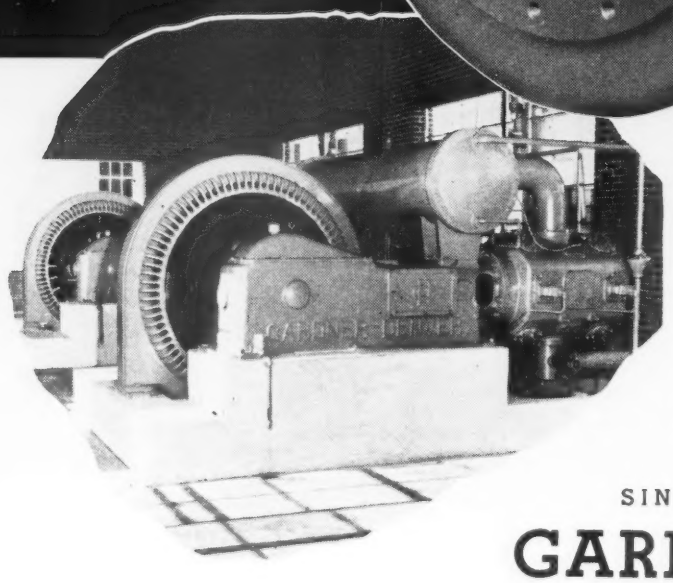


THE HINES FLASK CO.,

3431 WEST 140TH STREET, CLEVELAND 11, OHIO • TELEPHONE: ORCHARD 1-2806

the hole story of HA efficiency





EACH opening in the HA air cylinder has been plotted to fill your lines with extra cubic feet of air for every power dollar. Some holes take the free-flowing compressor valves. Some admit water to the effective cooling jacket. Other openings hold regulators that keep the HA in step with your air demands. Get the whole story today. Send for Bulletin HAC-36.

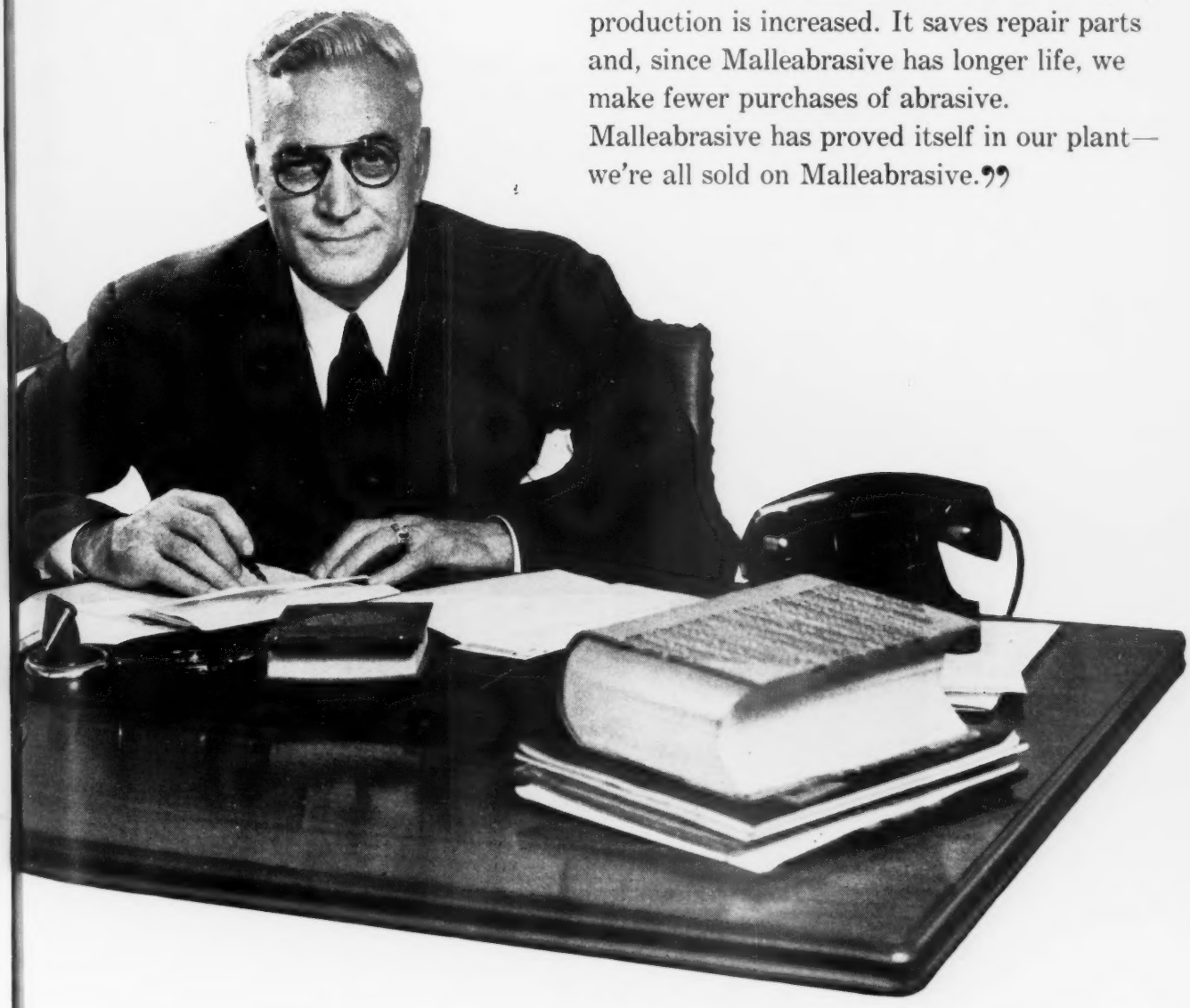
SINCE 1859

GARDNER-DENVER

Gardner-Denver Company, Quincy, Illinois
In Canada: Gardner-Denver Company (Canada), Ltd.,
14 Curity Ave., Toronto 13, Ontario

THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS

"Keeping costs down in a large operation is a difficult job. Our cleaning room superintendent suggested that one economy might be using Malleabrasive in our blast cleaning machines. We tried it—and were delighted! Malleabrasive saves us money in many ways. It does a quality cleaning job on all kinds of work. It cleans faster and cuts down-time, so production is increased. It saves repair parts and, since Malleabrasive has longer life, we make fewer purchases of abrasive. Malleabrasive has proved itself in our plant—we're all sold on Malleabrasive."



Next time you order abrasive, specify Malleabrasive from Pangborn Corporation, 1400 Pangborn Blvd., Hagerstown, Md.

Pangborn

DISTRIBUTORS FOR

MALLEABRASIVE

U. S. Patent # 2184926
(other patents pending)

Pangborn BLAST CLEANS CHEAPER with the right equipment for every job

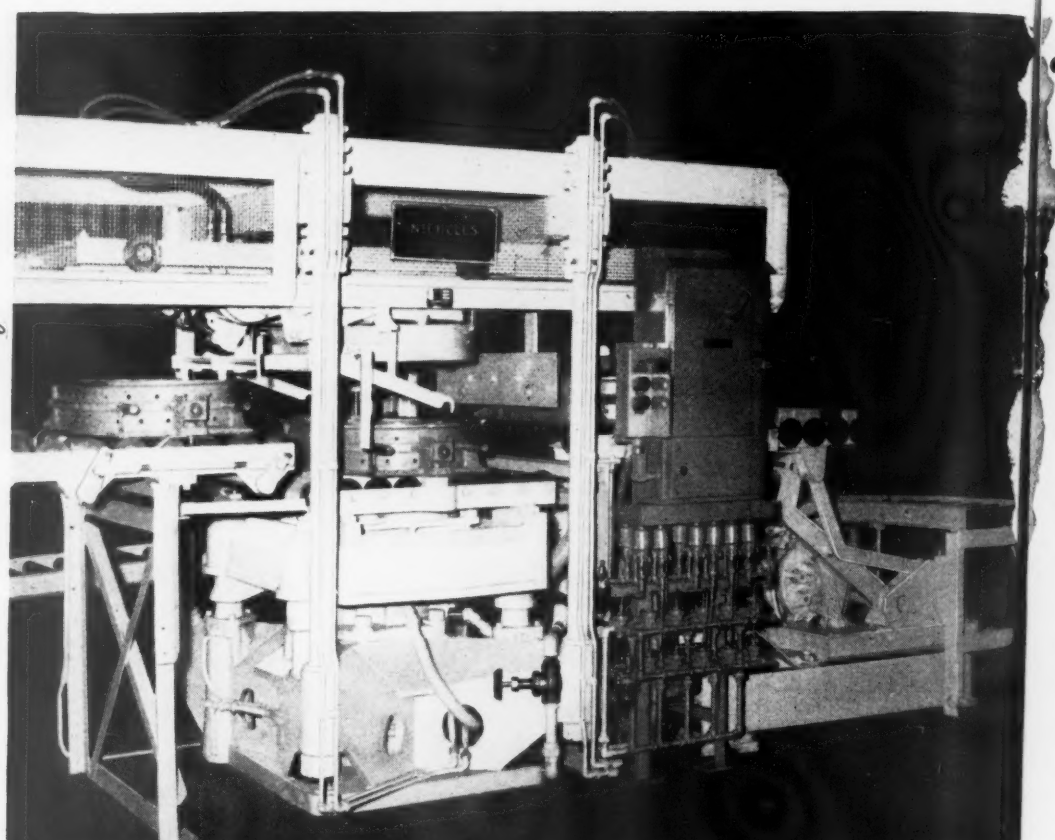
Look to Pangborn for the latest developments in Blast Cleaning and Dust Control Equipment

NICHOLLS

New "Push-Button" Molding Machine Is Simple and Economical To Operate

No. 21 Type C.F.—Jolt, Squeeze and Pattern Draw—Automatic-Push Button Control

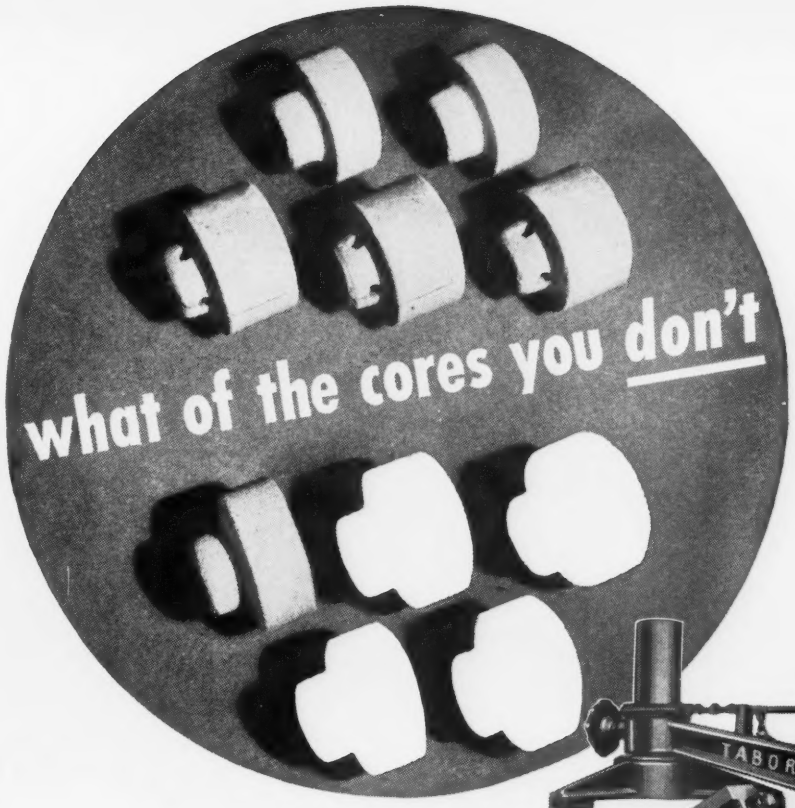
(Also Made in Smaller and Larger Sizes)



From start to finished mold, the Nicholls #21 Type CF Jolt, Squeeze and Patter Draw Molding Machine is push-button controlled to eliminate dangerous risk costly mistakes—to give you better molds *continuously*. Precision built for long yea of service... made with all the safety devices, the hidden "quality points" that re duce maintenance costs... the know-how that almost half a century of building qualit molding machines has made possible. If you're interested in better quality mol at lower cost—investigate these machines now. *For complete information, write t*

William H. Nicholls Co., Inc., Richmond Hill 18, Long Island, N.

NICHOLLS



...but what of the cores you don't make?

We mean the extra 40% production you lose

... those additional cores that a Tabor Rollover Core Machine could turn out for you in the same time.

The reason for "upped" production of small cores with the Tabor machine lies in its design—featuring simplicity, compactness, handy control.

There's no need for the operator to walk back and forth in order to clamp, level, roll over and unclamp the core box. Instead, he saves valuable time. From *one position*—and with *one control lever*—he completes each operation, from clamping the plate to conveniently swinging out the drawn core.

The ingenious features in the Rollover Core Machine are good examples of the plus-values built into all Tabor foundry equipment. That's what comes of 62 years' experience in designing and building foundry machines that more than meet foundrymen's needs.

TWO SIZES:

4" Draw — for boxes up to 12" x 20" x 7"

8" Draw — for boxes up to 14" x 24" x 12"

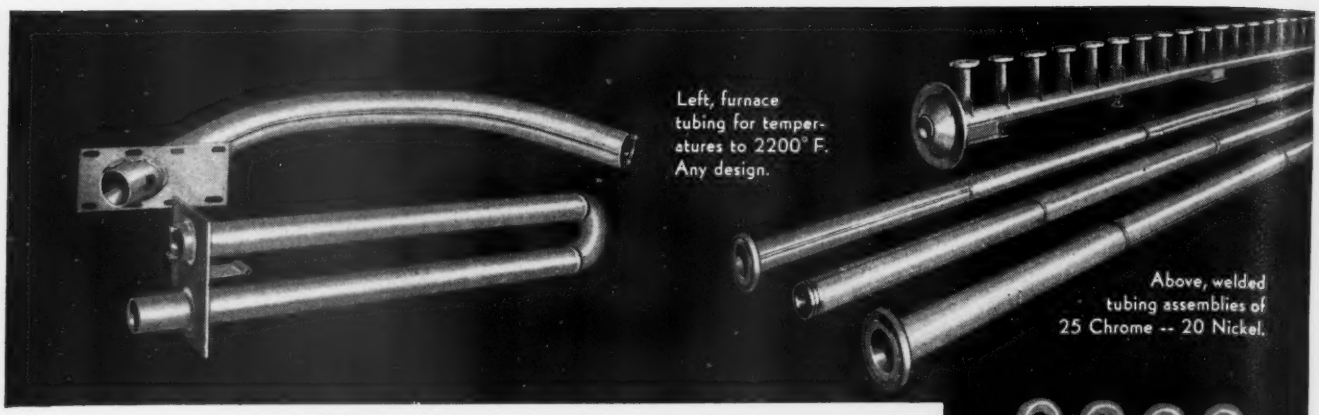
REPRESENTATIVES
Snyder Foundry Supply Company, Los Angeles, Calif.; The Pacific Graphite Company, Inc., 40th & Linden Sts., Oakland 8, Calif.; Carl F. Miller & Company, Seattle, Washington; Harry H. Reich, Trussville, Ala.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

The TABOR *Manufacturing Co.*

SINCE 1884 MANUFACTURERS OF FOUNDRY MOLDING MACHINES
6225 TACONY STREET • PHILADELPHIA 35, PENNA.

EXPORT DEPARTMENT, 765 DREXEL BLDG., PHILA. 6, PA.

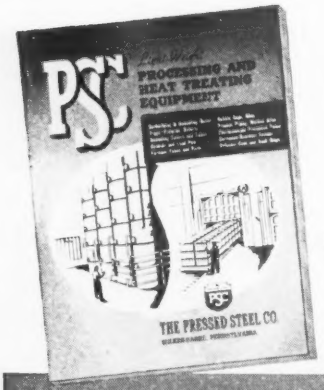


Left, furnace tubing for temperatures to 2200° F. Any design.

Above, welded tubing assemblies of 25 Chrome -- 20 Nickel.

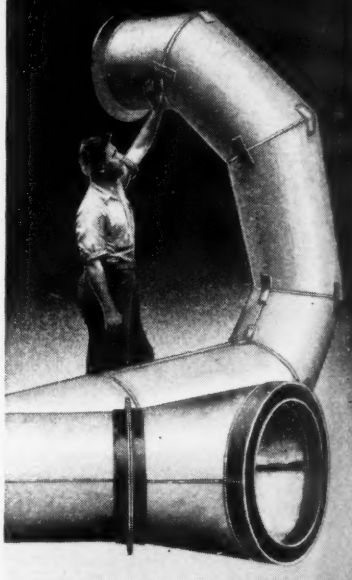
Cut Your Tubing Costs 3 Ways with PSC 'Thin Wall' Construction

Some customers have found that PSC heat and corrosion-resistant tubing has cut their costs over 50%. Take for example a company which had been using 3" tubing of standard I. P. S. .216" wall thickness, on an application where pressure and erosion were low, but temperature and corrosion conditions were constantly troublesome. They installed PSC tubing of only 16 gauge (1/16" section) but of a metal analysis suited to solve their troubles. The saving in metal in this case was over 71%. At the cost of alloy steels, this was very substantial. But this customer saved two other ways also: In the lower fabricating cost of light gauges. And in the less labor and material required to install PSC light-weight welded alloy tubing. The replacement saving is impressive. Specializing in precision fabrication of complex tubing assemblies, PSC furnishes tubes for all types of radiant furnaces, and for furnace externals such as vent stacks for exhausting fumes. Fabricated in any diameter up to 60" and in any alloy.



Send for **HEAT TREATING CATALOG 52**

Tubing of special anti-corrosive alloys.

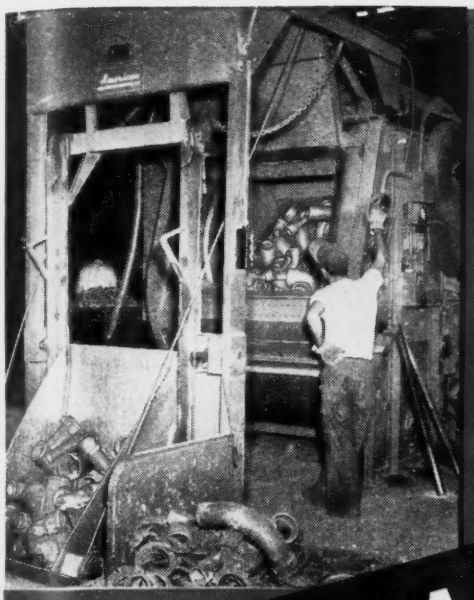


PSC light-weight welded alloy tubing facilitates construction problems in handling gases.

THE PRESSED STEEL COMPANY
of WILKES-BARRE, PENNSYLVANIA

Industrial Equipment of Heat and Corrosion Resistant WEIGHT-SAVING *Sheet Alloys*

☆ ☆ ☆ OFFICES IN PRINCIPAL CITIES ☆ ☆ ☆



SOIL PIPE FITTINGS
COST COMPARISON CHART

	FORMER METHOD	WHEELABRATOR METHOD
MACHINE	2 tumbling mills	48"x42" Tumblast
DAILY LABOR	24 man hours	16 man hours
COST PER TON	$5.27	$2.14

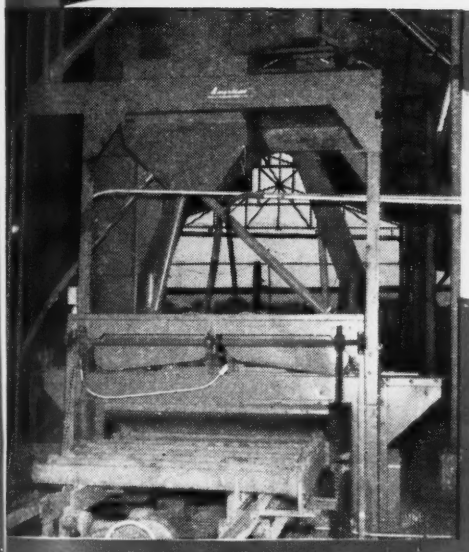
SAVINGS
$3.13 Per Ton

WHEELABRATOR®

AIRLESS BLAST CLEANING

SAVES $20,239.50 PER YEAR

in cleaning Soil Pipe and Fittings



for HERCO FOUNDRY INC.
South Gate, California

It costs less than half as much to clean soil pipe and soil pipe fittings at Herco Foundry Inc., since they started using Wheelabrator airless abrasive blast cleaning equipment. Where five tumbling mills were formerly required, only two Wheelabrator machines are now used . . . and they clean 42% more work each day.

A Wheelabrator Tumblast cleans soil pipe fittings for $2.14 a ton, compared to $5.27 a ton by former methods.

A Wheelabrator Cabinet cleans the long pieces of soil pipe quickly and thoroughly with decreased manual handling. As a result cleaning time has been cut to a minimum and labor requirements have been greatly reduced.

Wheelabrating completely removes every trace of sand to set a new standard of soil pipe cleaning quality. Herco's customers are enthusiastic about the improved appearance of the products. Wheelabrating is quiet and dust free, in direct contrast with the noise and dirt previously experienced.

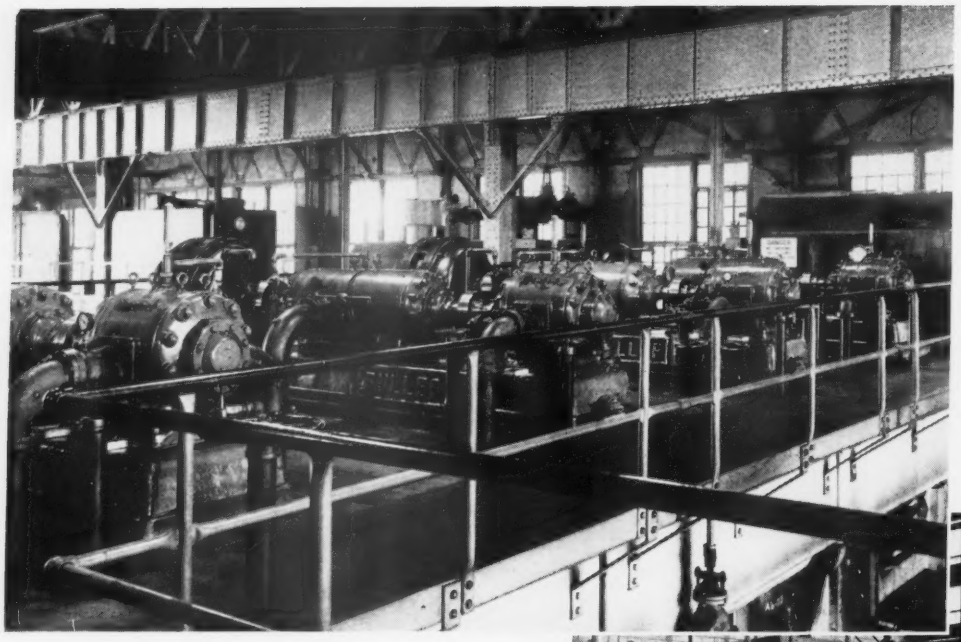
There is no sounder investment than a Wheelabrator because it customarily pays for itself out of savings within six to 18 months. Write today for full details.

SOIL PIPE
COST COMPARISON CHART

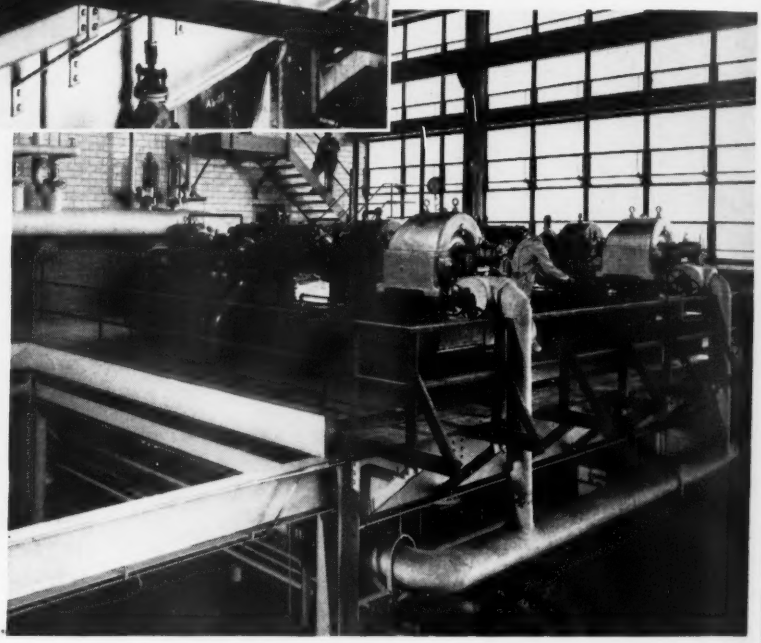
	FORMER METHOD	WHEELABRATOR METHOD
MACHINE	3 tumbling mills	Special Cabinet
DAILY LABOR	32 man hours	20 man hours
COST PER TON	$2.88	$1.28

SAVINGS
$1.60 Per Ton

American
WHEELABRATOR & EQUIPMENT CORP.
505 S. Byrkit St., Mishawaka, Indiana



Views of Fuller Rotaries installed on balconies; overhead, out of the way. Left: Four two-stage; capacity each 1665 c.f.m., 100-lb. psig. Below: Two two-stage; capacity each 1592 c.f.m., 120-lb. psig.



Eliminate heavy, costly foundations with FULLERS

*** simple * compact**

*** direct drive * valveless**

*** vibrationless * pulseless**

If you've never considered the many outstanding advantages of Fuller Rotary Compressors and Vacuum Pumps, now is the time to do so.

Fullers have many unique and beneficial advantages for low cost operation. They can be placed almost anywhere out of the way, because their vibrationless, rotary action permits installation, for example, on a balcony or upper floor of a building . . . no heavy, costly foundations being required. Operated by direct drive, you reduce initial and maintenance costs, as well as transmission losses incident to gear and belt drives.

Because Fuller Rotaries compress without reciprocating motion the air-stream is, in effect, non-pulsating. They're extremely compact for volumes delivered; sizes are available to deliver up to 3300 c.f.m., actual free-air, for pressures to 125 psig., from atmosphere.

Write today to Fuller Company—have one of its compressor engineers recommend the *right* compressor for your operation—one that will give you life-time efficiency and capacity.

Fuller

Pioneers of high efficiency vane-type rotary compressors

FULLER COMPANY
Catasauqua, Pa.

Branch Offices: Chicago • San Francisco • Los Angeles • Seattle • Birmingham

C-239
2156

1 UNLOAD SAND FROM BOX CARS
2 CARRY COAL TO PULVERIZERS
3 WINDROW SAND FOR CUTTER
4 ADD NEW SAND TO OLD
5 REMOVE CUT SAND FROM FLOOR
6 DELIVER SAND TO MOLDERS
7 DELIVER CORE SAND TO CORE DEPARTMENT
8 CHARGE MULLERS
9 CARRY NEW SAND TO STORAGE
10 CHARGE HOPPERS
11 HANDLE ASHES
12 CARRY OUT SLAG
13 HANDLE SCRAP AND SMALL CASTINGS
14 CLEAR DRIVES AND YARD OF SNOW
15 HAUL AND PUSH
16 DO CRANE WORK
17 MISCELLANEOUS HANDLING JOBS

PAYLOADERS at Peoria Malleable PAY OFF 17 WAYS

Peoria Malleable Castings Co. believes in mending the roof *before* it rains. Although operations were profitable, they decided to mechanize more completely to improve their productive capacity and to lower costs. Their first step was to purchase "PAYLOADER" tractor shovels to eliminate hard, manual material handling jobs. Examples of the many benefits "PAYLOADERS" accomplished for them are:

(1) 21 manhours of labor saved unloading each box car of sand (2) cut costs 30% in the night shift on mold dump and clean up. "PAYLOADERS" deliver all sand to a central muller, deliver all sand to molding stations, deliver 65-70 loads of coal per day from outside stockpile to two pulverizers . . . do many other material-handling and other chores faster and cheaper.

If you want to know how these fast, maneuverable machines can save time, labor and costs in *your* foundry, call in your PAYLOADER Distributor, or write The Frank G. Hough Co., 703 Sunnyside Avenue, Libertyville, Illinois.

ALL THE FACTS—

FREE

The full report, with pictures of "PAYLOADER" use at Peoria Malleable is contained in INDUSTRIAL HANDLING Magazine, Vol. 2, No. 1. Write for your copy.

SAY "HUFF"

PAYLOADER®

THE FRANK G. HOUGH CO. • Since 1920

Hundreds of hours longer...

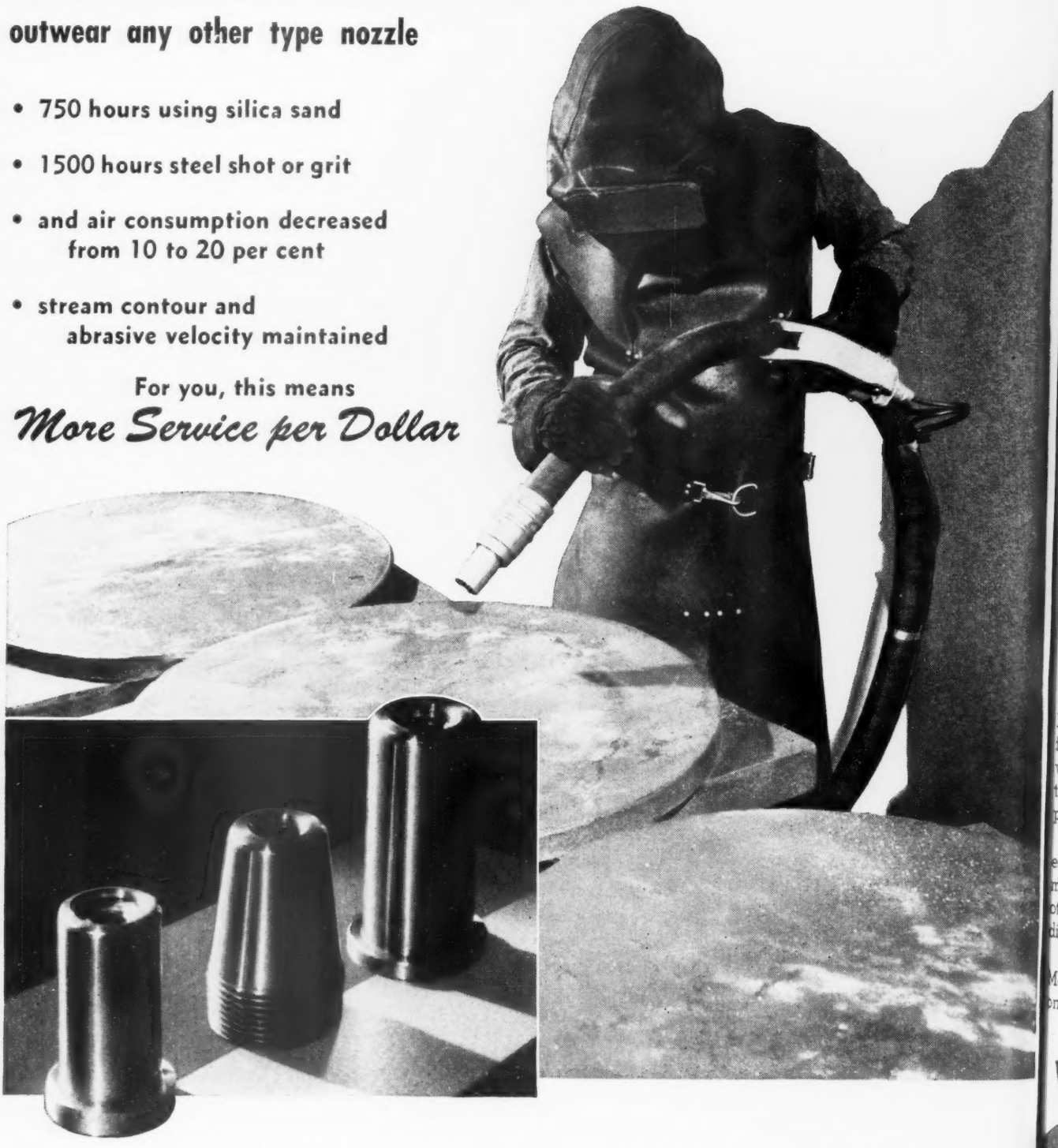
NORBIDE® Pressure Blast Nozzles

outwear any other type nozzle

- 750 hours using silica sand
- 1500 hours steel shot or grit
- and air consumption decreased from 10 to 20 per cent
- stream contour and abrasive velocity maintained

For you, this means

More Service per Dollar



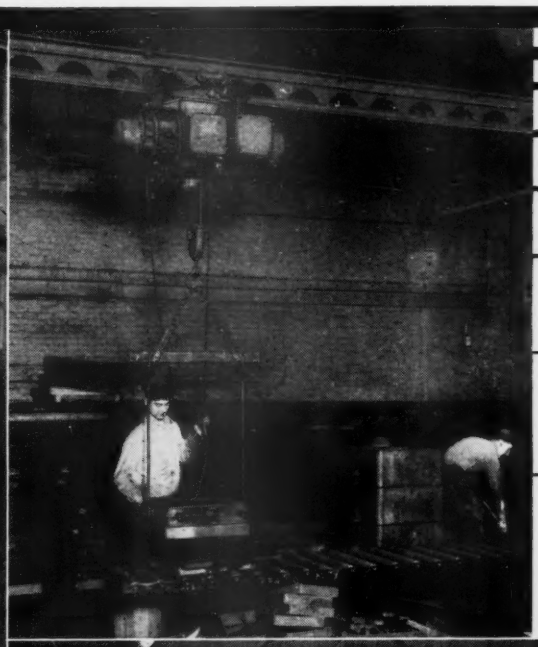
Only the diamond is harder than Norbide

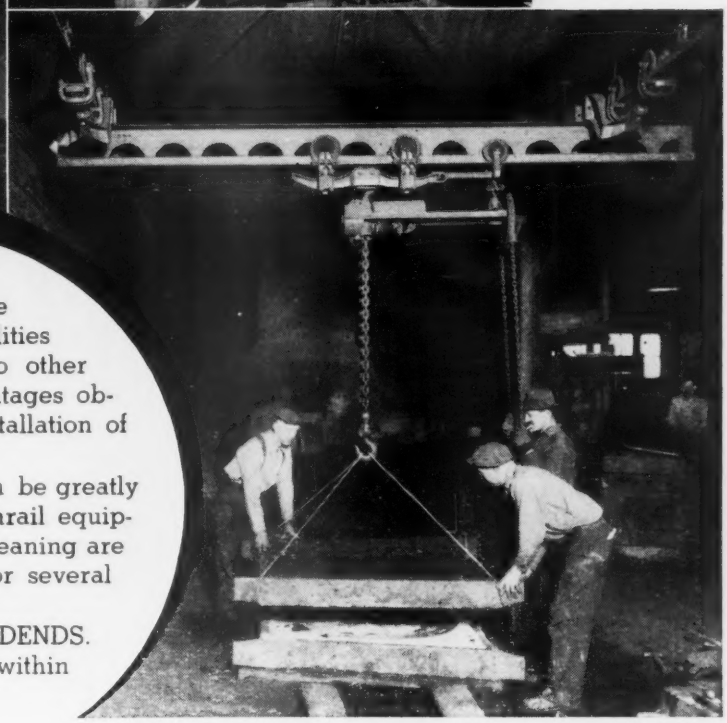
NORTON® **NORTON COMPANY**

WORCESTER 6, MASSACHUSETTS

Making better products to make other products better

SPEED MOLD-MAKING
the efficient Cleveland Tramrail Way





Wherever materials of any kind in a foundry are lifted, moved or handled, there usually are possibilities for effecting important economies. Probably in no other way can so much be saved and as many advantages obtained for such a small investment as through installation of proper materials handling equipment.

Mold-making is one of the many jobs that can be greatly eased and speeded with overhead Cleveland Tramrail equipment. Pouring, sand-handling, cupola-charging, cleaning are others. Often the same equipment can be used for several different purposes.

Cleveland Tramrail pays dividends — BIG DIVIDENDS. Most installations pay for themselves out of savings within one year; some in less than six months.

GET THIS BOOK!
BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy.

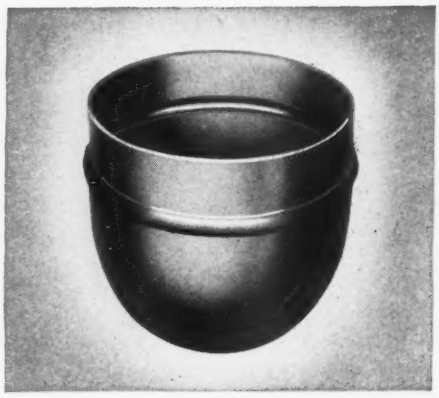
CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
3806 East 286th St. Wickliffe, Ohio.

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

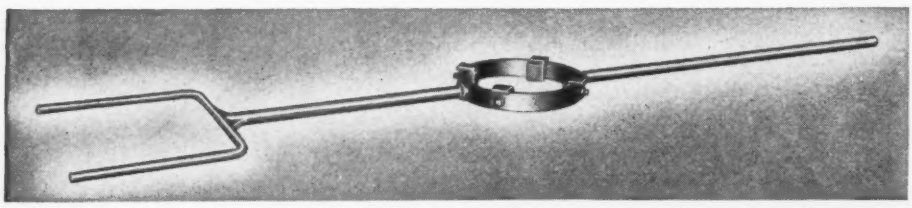
NO. 1 SOURCE FOR

Bowls · Shanks · Tongs

Industrial Equipment round bottom pressed steel ladle bowl, 50 lb. capacity, type 7 flat side.

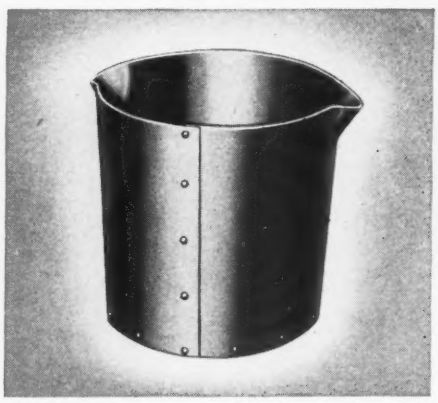


Industrial Equipment round bottom pressed steel ladle bowl, 60 lb. capacity, type 14 circular.

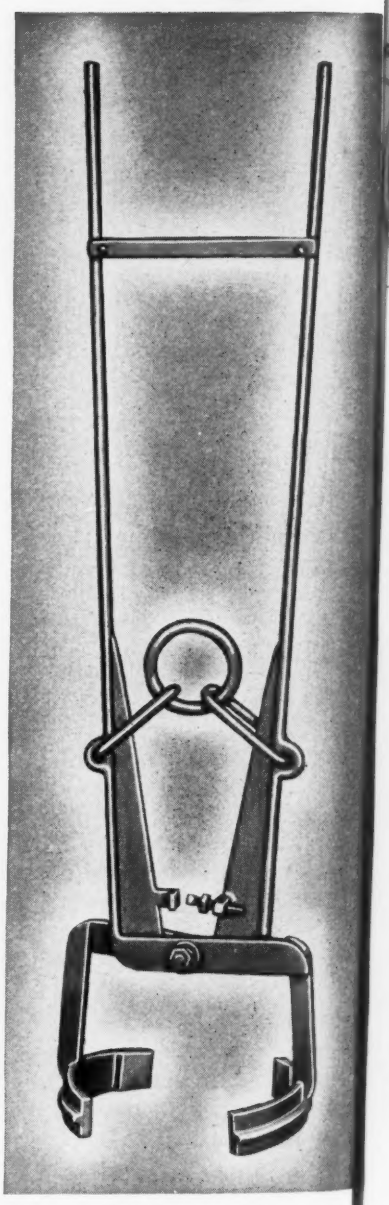


Industrial Equipment type 30CA single and adjustable ladle and crucible shank. Four-point suspension . . . easily adjustable . . . no springs . . . air cooled band. Fixed band types also available.

Industrial Equipment type 514 flat bottom welded steel ladle bowl. Available in almost any size or thickness.



Industrial Equipment 537 flat bottom riveted steel ladle bowl.



Type 72C crucible tongs. Adjustable. Four-point suspension. Claw types also available.

The above Industrial Equipment products, along with dozens of other types of bowls, shanks, tongs and ladles, are included in our latest catalog. *Write for your copy.*

LADLES

SHANKS

BOWLS

TONGS

Industrial

EQUIPMENT COMPANY

115 NORTH OHIO ST., MINSTER, OHIO

When the horseless carriage was first scaring horses . . .

Demmler Core Blowers were already first

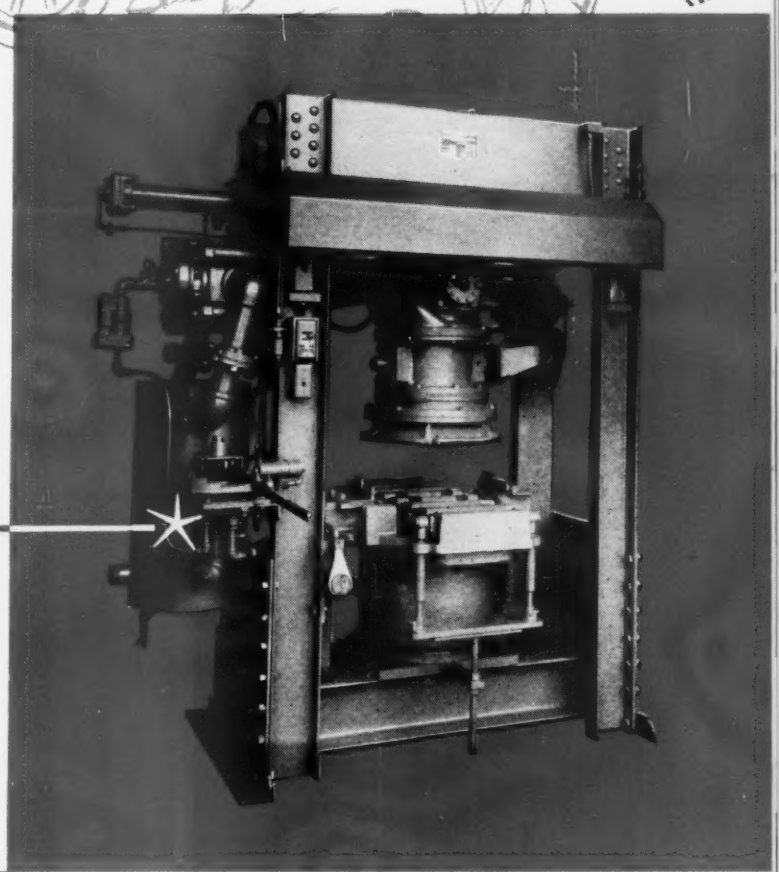
Way back when this 1909 Stanley Steamer first interrupted a Sunday afternoon band concert, Demmler Core Blowers were already stepping up production of industrial castings. They've enjoyed leadership for 43 years because Demmler Core Blowers have *always* been *faster, more dependable.*

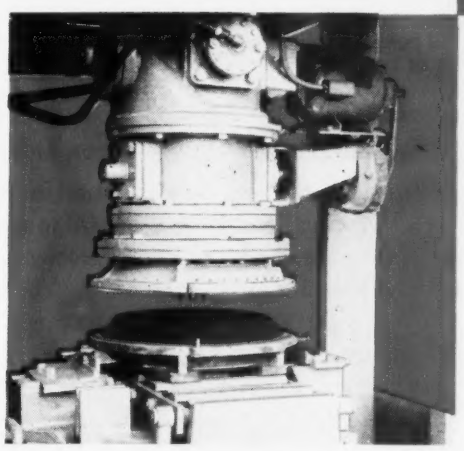
Our latest leader

THE DEMMLER MODEL 103

We're proud of our latest model — the 103! Compare this performance with any other core blower: On a defense project the Demmler 103 blew 16,000 cores every 8 hours. That's 2,000 cores per hour.

The 103 is a stationary magazine type core blower, capable of blowing ANY core or molding sand. Two sizes are available — the 103 for cores up to 50 pounds and a larger model called the 104 designed to handle cores up to 250 pounds. Hand or automatic operation, six second cycle — the latest and best in core blowers!





Write for literature

SAND AGITATOR AVAILABLE

A motor driven sand agitator is available as an accessory when blowing extremely heavy sands. Thoroughly tested, this agitator has been in use on Demmler Core Blowers for years. The core shown on the table of the machine in the inset is blown with molding sand. This core blower is guaranteed to blow ANY molding sand or core sand required in the foundry!

WM. DEMMLER & BROS., Kewanee, Ill.

Quality, too, may be only skin-deep

1 This apparently sound casting comes from the foundry ready for subsequent machining.

2 Machining uncovers blowholes at critical point—necessitating rejection or repair.

3 Radiograph made before machining would have revealed blowholes, saved time and money.

For fast, non-destructive inspection, use General Electric Industrial X-Ray

Whether you're buying or selling castings, x-ray inspection is a high-speed, low-cost method of insuring unvarying quality. Hidden defects in job lots or on production lines are detected prior to expensive finishing operations.

The above illustrations show why so many leading industries today rely on x-ray for non-destructive inspection. In many plants, x-ray is also used as a development tool — to disclose where savings can be made, designs improved, new techniques developed.

Chances are, there's a place for industrial x-ray in your business. We will be glad to appraise your needs. Or, if you have a specific problem, GE has probably handled a parallel situation. You can benefit from this previous experience by writing X-Ray Department, General Electric Co., Milwaukee 1, Wis., Rm. YY-8.

You can put your confidence in —

GENERAL ELECTRIC

GREEN-X SUPER DUTY GRAPHITE-TYPE PLASTIC REFRACTORY

A. P. Green REFRACTORY PRODUCTS

PROVED ON-THE-JOB TO GIVE YOU 6 ADVANTAGES

1. More tonnage per lining . . . made from the finest quality super duty fire clay.
2. Easier cleaning with less damage to the lining . . . less adhesion of slag and skull to the lining.
3. Reduces erosion of molten metal . . . develops strong bond throughout entire thickness.
4. Metals flow more easily through troughs and pouring spouts . . scientifically incorporated graphite has lubricating effect.
5. Provides cleaner metal and more perfect castings . . . successfully resists the attack of molten metal and slag.
6. Fewer laminations and less tendency toward shrinkage.

GREEN-X—
scientifically developed for long life in lining

Forehearth or Holding Ladles

Bull Ladles

Pouring Ladles

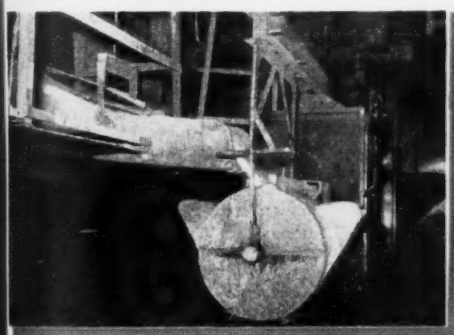
Hand Ladles

Cupola Wells

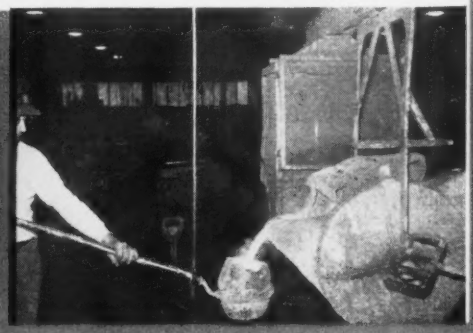
Cupola Slag Holes

Malleable Furnace —runners & spouts

Cupola —runners & spouts

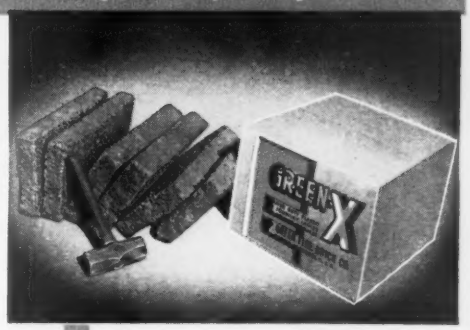


1400-lb. capacity transportation ladle and cupola trough lined with Green-X.



Transportation ladle and pouring ladle are both lined with Green-X for longer life and cleaner metal.

Green-X is pre-sliced and conveniently packaged in 100-lb. waterproof cartons . . . designed for easy handling.



WAREHOUSE STOCKS FOR PROMPT DELIVERY

Look in the classified section of the telephone directory or write direct for the name of the A. P. Green distributor in your locality. He has complete stocks and can make prompt delivery.

A. P. GREEN FIRE BRICK CO.

MEXICO, MISSOURI, U. S. A.

In Canada
A. P. Green Fire Brick Co., Ltd.
Toronto 15, Ontario

DISTRIBUTORS IN THE PRINCIPAL CITIES OF THE WORLD

Dependability...

There's nothing like a reputation for dependability, so we feel justifiably proud when satisfied customers tell us how much they appreciate the dependability of Ohio Ferro-Alloys. Day in and day out for 25 years we have been supplying ferro-alloys to the iron and steel industry. Strategically-located plants and readily-available warehouse stocks assure prompt attention to your order. We invite you to join our growing list of satisfied customers who find our delivery and services just as dependable as our time-tested quality products.

PHILO · TACOMA · BRILLIANT

Ohio Ferro Products

- FERRO-SILICON 25 - 50 - 65 - 75 - 85 - 90%
- SPECIAL BLOCKING 50% FERRO-SILICON
- SILICON METAL
- HIGH CARBON FERRO-CHROME
- LOW CARBON FERRO-CHROME SILICON
- FERRO-MANGANESE
- BOROSIL
- SIMANAL
- RARE EARTH ALLOYS

Briquets

- SILICON
- MANGANESE
- SILICO-MANGANESE
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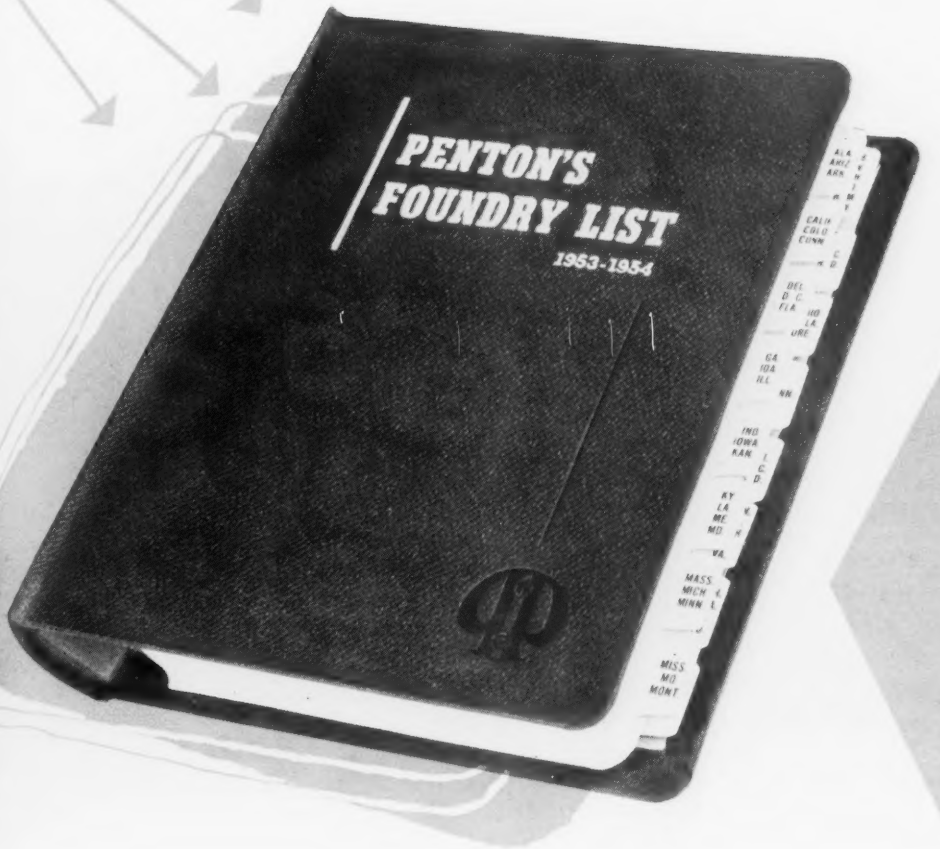
Ohio Ferro-Alloys Corporation
Canton, Ohio

Chicago Detroit Pittsburgh Tacoma Seattle
Minneapolis Birmingham San Francisco Los Angeles

New Foundry List

to be published

September 15, 1953



Who? Where?

Metals Melted?

Melting Equipment & Capacity?

Departments Operated?

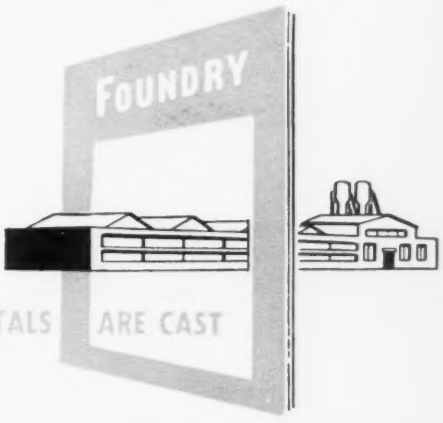
Casting Methods?

• For many years, FOUNDRY has conducted an intensive census of the foundry industry in the United States and Canada . . . every two years, basic information on all foundries is published in *Penton's Foundry List and Directory.*

The 1953-54 Edition of PFL is now available for early delivery. It gives comprehensive information on all of the 5,938 foundries in the U. S. and Canada. It tells who they are and where they are located; what metals they melt, their melting equipment capacities, and departments operated.

Well-indexed, and in loose-leaf form, PFL is useful to casting buyers and foundry suppliers. For prompt delivery, write: Book Department, FOUNDRY, 1213 West Third St., Cleveland 13, Ohio.

PRICE: $75 PER COPY
orders now being taken for delivery immediately on publication.



Serving Foundrymen

A PENTON PUBLICATION, PENTON BUILDING, CLEVELAND 13, OHIO

OTHER DINGS PRODUCTS FOR THE FOUNDRY—

Electric and Non-electric Magnetic Pulleys

Non-electric Magnetic Drums

Non-electric Perma-Plate Magnets

Self-Cleaning Perma-Plate Magnets

Rectangular Suspended Magnets

Self-Cleaning Rectangular Suspended Magnets

Portable and Stationary Pulley-type Separators

DINGS ALL-WELDED, WEATHERPROOF LIFTING MAGNETS:

- LIFT A LITTLE MORE
- WEIGH A LITTLE LESS
- LAST A LITTLE LONGER

— BUT COST NO MORE

BACKED by over 50 years of experience in the field of electro-magnet construction. Dings has supplied more foundries with magnetic separators than any other firm. When you need a lifting magnet check the DINGS.

Write for catalog B-1401-A giving construction details, capacities, ratings and dimensions.

DINGS MAGNETIC SEPARATOR COMPANY
4708 W. Electric Ave., Milwaukee 46, Wis.

Dings Magnets

LM-3

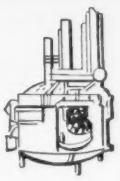
CONTROL is the key

to the unequalled performance of

WHEELABRATOR® STEEL SHOT

THESE CHECK POINTS GUARANTEE THE PERFORMANCE OF WHEELABRATOR® STEEL SHOT

MELTING

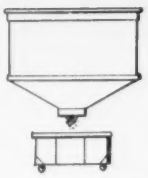


1. Rigid scrap selection.
2. Preliminary carbon and manganese analysis.
3. Complete chemical analysis.

POURING

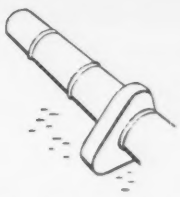
4. Accurate and continuous control of pouring temperature.
5. Accurate and continuous control of quench temperature.

FIRST SCREENING



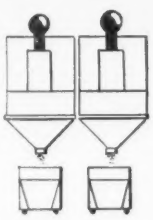
6. Visual and metallographic inspection in as-cast condition.
7. Hardness check in as-cast condition.
8. Continuous inspection of screening operation.

DRYING and SHOT CONDITIONING



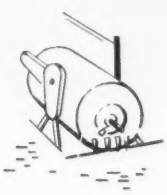
9. Recording temperature control.
10. Removal of objectionable material.

SECOND SCREENING



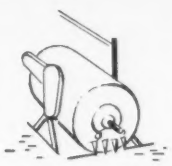
11. Continuous inspection of screens.

FIRST HEAT TREATING



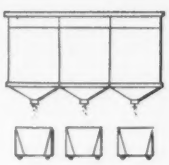
12. Automatic control and permanent record by recording instrument of heat treat time and temperature.

SECOND HEAT TREATING



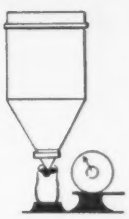
13. Automatic control and permanent record by recording instrument of heat treat time and temperature.
14. Continuous tests for hardness and carbon content.
15. Continuous microscopic inspection.

FINAL SCREENING



16. Continuous inspection of screens and shot.
17. Daily laboratory checks of screening accuracy.

BAGGING



18. Continuous inspection of shot.
19. Daily shot breakdown tests.

How many perfect castings do you make in a hundred million pieces? One average shipment of shot, either iron or steel, contains that many individual castings. The greater percentage of imperfect castings it contains, the faster it breaks down and requires replacement. Even slight variations in structure or hardness can have a tremendous effect on cleaning costs.

After years of research, Wheelabrator has developed and patented a method for producing shot with an absolute minimum of defective pellets. It took a new plant and new production methods in order to achieve this quality and there are 19 CONTROL CHECKS to see that it is maintained.

This new "Wheelabrator" Steel Shot is made of the finest electric furnace steel which is heat treated to a tempered Martensite microstructure, the hardest and toughest of the iron carbon alloys. It is given a double heat treatment at automatically controlled temperatures to provide a new standard of toughness, solidity, uniformity and efficiency.

FOR YOU this means less abrasive to buy, fewer machine parts to replace, less maintenance labor required and lower freight costs.

Bulletin 89 tells the complete story about "Wheelabrator" Steel Shot and what it means to the user in terms of performance and economy. Write for your copy today.

American

WHEELABRATOR & EQUIPMENT CORP.

505 S. Byrkit St., Mishawaka, Indiana

WORLD'S LARGEST BUILDERS OF AIRLESS BLAST EQUIPMENT

IF BETTER MOLDS CAN BE MADE, YOU CAN MAKE THEM WITH

NATIONAL BENTONITE

WHY IT'S FIRST CHOICE WITH MANY GOOD FOUNDRYMEN:

Consistently uniform high quality • Good green strength • High hot strength • High tensile strength • Yields high permeability • Provides high deformation • High sintering point • Requires least water to temper correctly • Good mold durability • Close laboratory control

Among good foundrymen, you'll find many an experienced man who prefers National Bentonite for bonding because he knows he can depend on the many properties it offers to provide a superior bond . . . which means, in terms of better production, better castings which require less time in the cleaning room.

Proper moisture control being one of the most important factors in good mold characteristics, it's always best to use a bonding material that requires the least amount of water to temper correctly. Foundrymen have found that they can control their moisture content correctly with proper proportions of National Bentonite in their molding sand. That's why so many good foundrymen say, "I can rely on National Bentonite."

FIRST CHOICE WITH MANY GOOD FOUNDRYMEN FOR YEARS

Quick Service From Better Foundry Suppliers Everywhere

Baroid

Baroid Sales Division ★ National Lead Company
Bentonite Sales Office: Railway Exchange Building, Chicago 4, Illinois

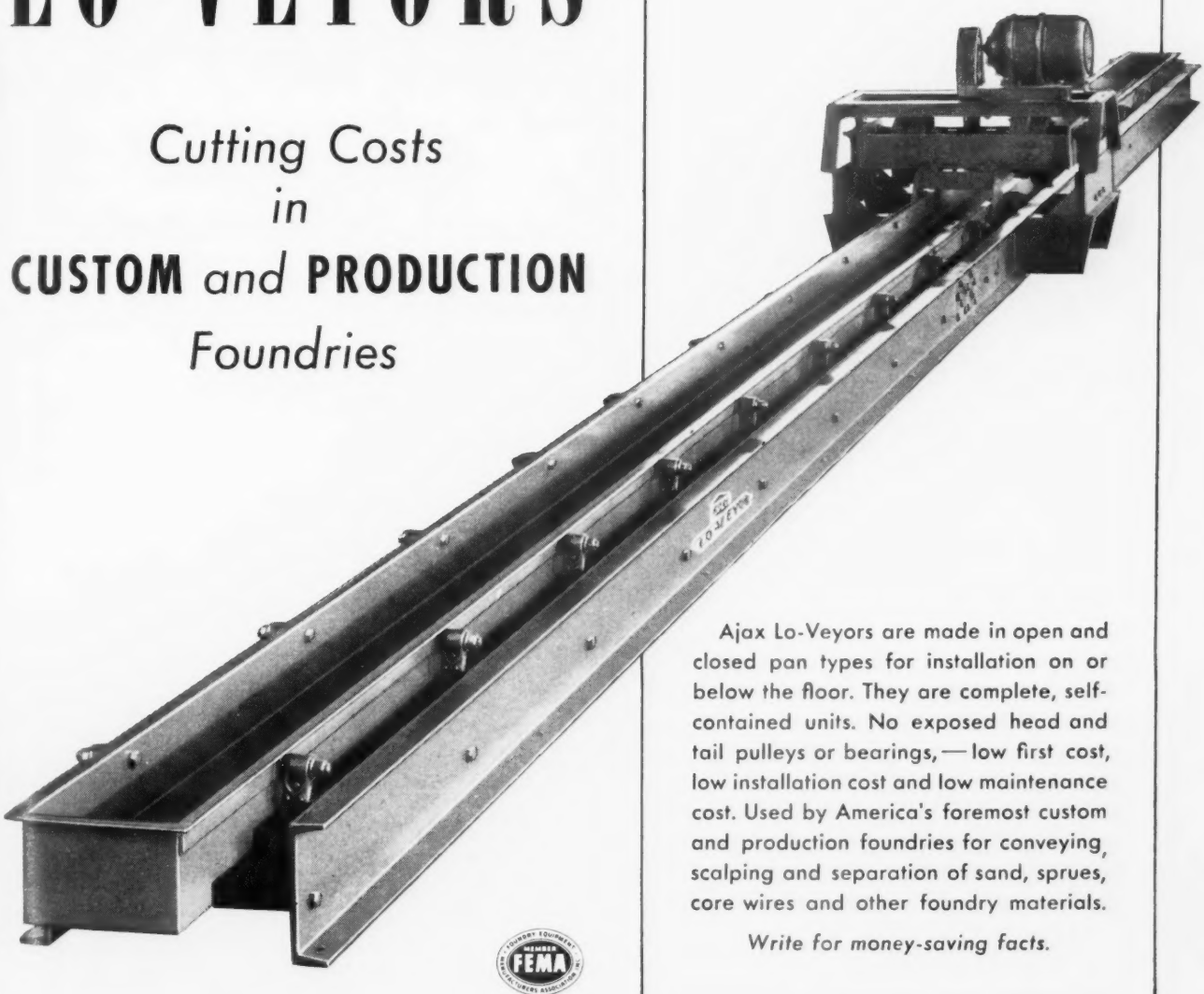
AJAX

LO-VEYORS

Cutting Costs
in
CUSTOM *and* **PRODUCTION**
Foundries

● When the pressure is on for lower cost of castings-per-pound, it is a smart idea to cut sand handling costs.

Ajax Lo-Veyors take sand handling out of the non-productive labor column. And that is something to think about right now when you think of cost per man per hour.



Ajax Lo-Veyors are made in open and closed pan types for installation on or below the floor. They are complete, self-contained units. No exposed head and tail pulleys or bearings,—low first cost, low installation cost and low maintenance cost. Used by America's foremost custom and production foundries for conveying, scalping and separation of sand, sprues, core wires and other foundry materials.

Write for money-saving facts.

AJAX FLEXIBLE COUPLING CO. INC., WESTFIELD, N. Y.

Protective Clothing

For Lower Costs In Leg Protection . . .

AO's NEW 1512R LEGGING

with Removable, Re-usable Frame

Something new has been added to AO's standard spring steel 1512 Legging in this companion model . . . *replaceability* of either frame or fabric. This feature means lower costs in leg protection two ways:

1. If the covering is torn or burned, a complete new unit is not necessary. Just order a new covering.

2. Should a spring become broken, keep the covering and order a new frame.

Instead of being sewn to the frame, the covering is attached by snap fasteners. No adjustments are necessary. Fits securely at ankle and instep. Air space between legging and leg helps insulate for comfort. AO's 1512R Legging is easy to put on . . . easy to remove. Your nearest AO Safety Products Representative can supply you.

Available in chrome-tanned *cowhide* as the 1512R-CL, in *asbestos* as the 1481R-A, in *flame-resistant duck* as the 1482R-FR.

American Optical

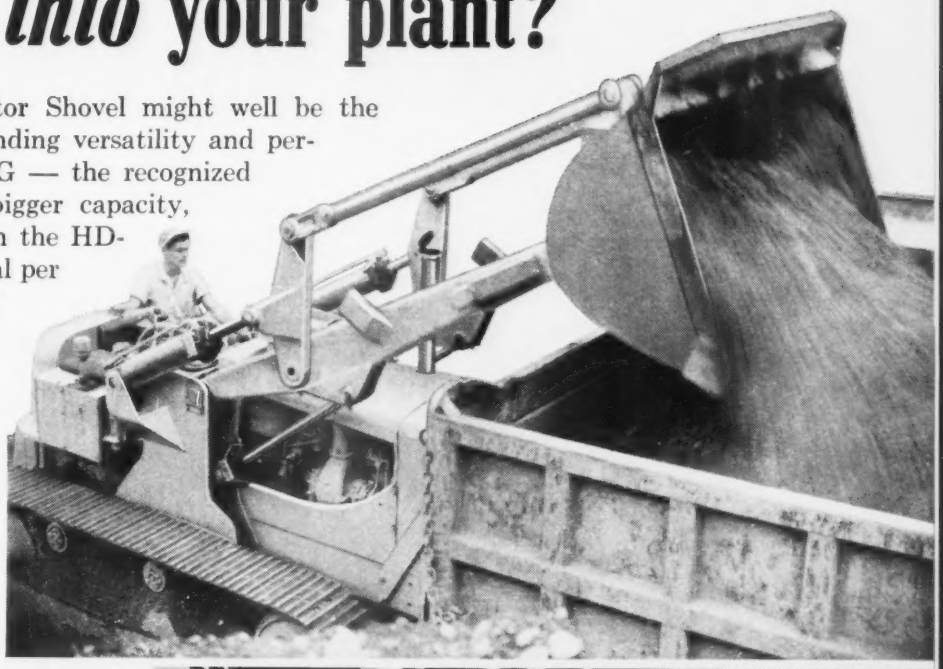
SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

MR. PRODUCTION MANAGER:

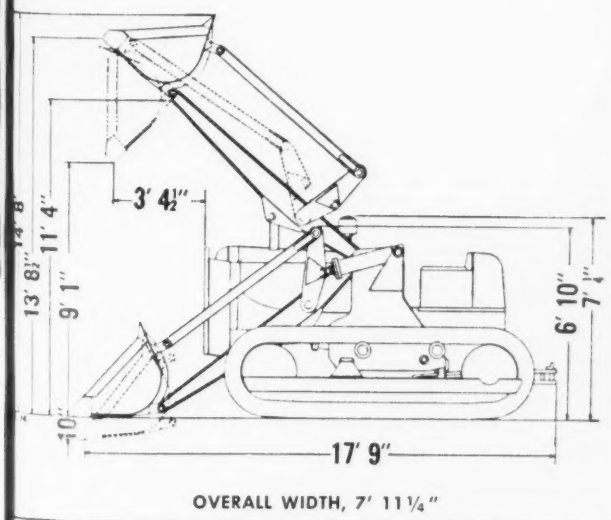
are you looking for a way to feed more output capacity *into* your plant?

This Allis-Chalmers HD-9G Tractor Shovel might well be the answer. It offers the same outstanding versatility and performing ability as the 1-yd. HD-5G — the recognized standard of comparison — *plus* bigger capacity, higher reach and more power. With the HD-9G, one man can move more material per shift . . . handle a wider variety of jobs inside and out.



The HD-9G digs, stockpiles, loads trucks, feeds hoppers — handles any bulk material two big yards at a scoop. Special 3½-yd. light materials bucket almost doubles output in materials weighing not more than 1400 lb. per cu. yd. Exclusive Allis-Chalmers shift pattern further speeds loading by allowing operator to go from low forward to fast reverse with one simple gear shift.

Here is a Tractor Shovel that reaches for extra jobs. With bucket fully raised, it dumps into high bins. Also, tractor can work right up on storage piles, making it possible to put many more yards of material in a given area.



OVERALL WIDTH, 7' 11¼"

Compact design, plus the ability to turn in its own track length enables the HD-9G to work in confined areas or where there is little more than tractor-height head room.

The HD-9G has the power, weight and traction to handle tough excavating on new construction, maintain yard roads and parking lots, spot railroad cars, lift, carry, push or pull heavy loads of all kinds.

Ask your Allis-Chalmers Dealer to show you the many ways this HD-9G has helped others step up production.

ALLIS-CHALMERS
TRACTOR DIVISION — MILWAUKEE 1, U. S. A.

DELTA
NO-VEIN COMPOUND

Ends

VEINING AND METAL PENETRATION IN YOUR CORE SAND MIXES

DELTA was first to introduce a NO-VEIN COMPOUND to the Foundry Industry. Today, DELTA NO-VEIN COMPOUND is the only product of its kind made with a *SERIES OF OXIDES,* plus *CARBON,* which produces the required plasticity and hot strength in core sand mixes.

With the addition of only a small amount of DELTA NO-VEIN COMPOUND (1% to 3% maximum) sand grain expansion is materially retarded and veining and metal penetration eliminated.

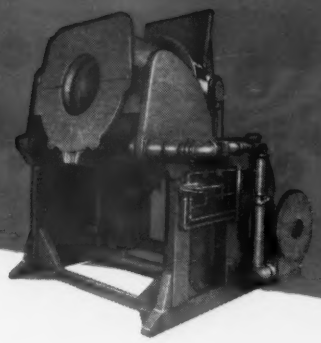
DELTA

Working samples and complete literature on Delta Foundry Products will be sent to you on request for test purposes in your own foundry.

DELTA OIL PRODUCTS CO.

MANUFACTURERS OF SCIENTIFICALLY CONTROLLED FOUNDRY PRODUCTS

MILWAUKEE 9, WISCONSIN



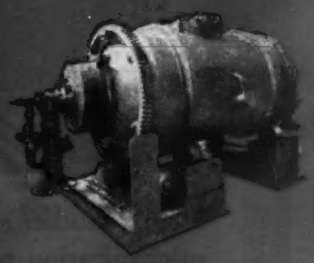
a complete line of

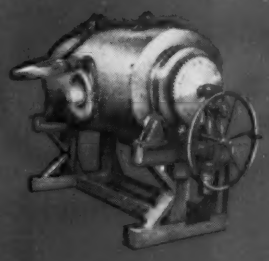
MELTING AND HOLDING FURNACES

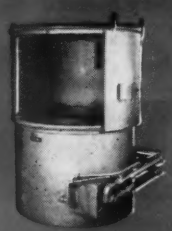
by Lindberg-Fisher

for melting

aluminum
magnesium
copper
copper-nickel alloys
bronze
brass
yellow brass
red brass
tin
zinc
lead
babbitt
type metal
gold precipitates
silver precipitates







Because Lindberg-Fisher builds *all* kinds of melting equipment . . gas . . oil . . electric . . induction, and carbon arc . . L-F engineers are able to recommend, without prejudice, the proper type of furnace for *your* particular melting requirements.

Melting specialists for 25 years
Sales and service offices in principal cities

Bulletin 551 covers the complete melting line. Write for your copy today.

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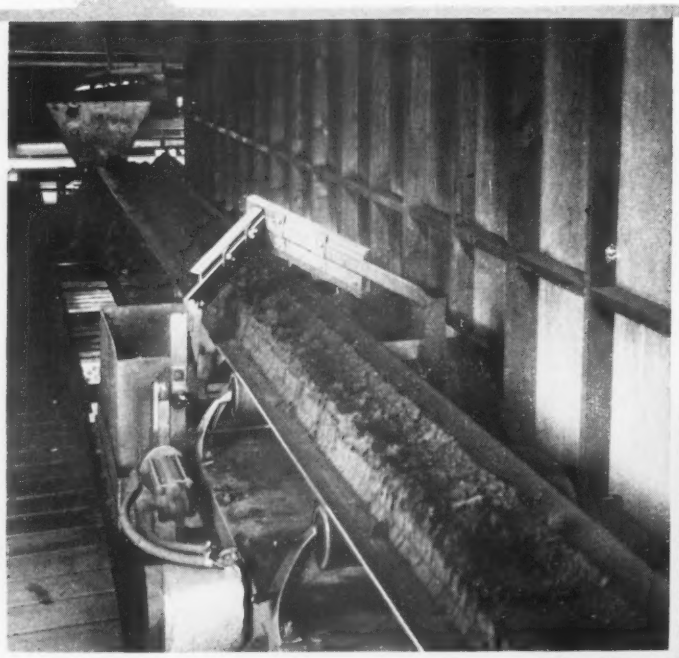
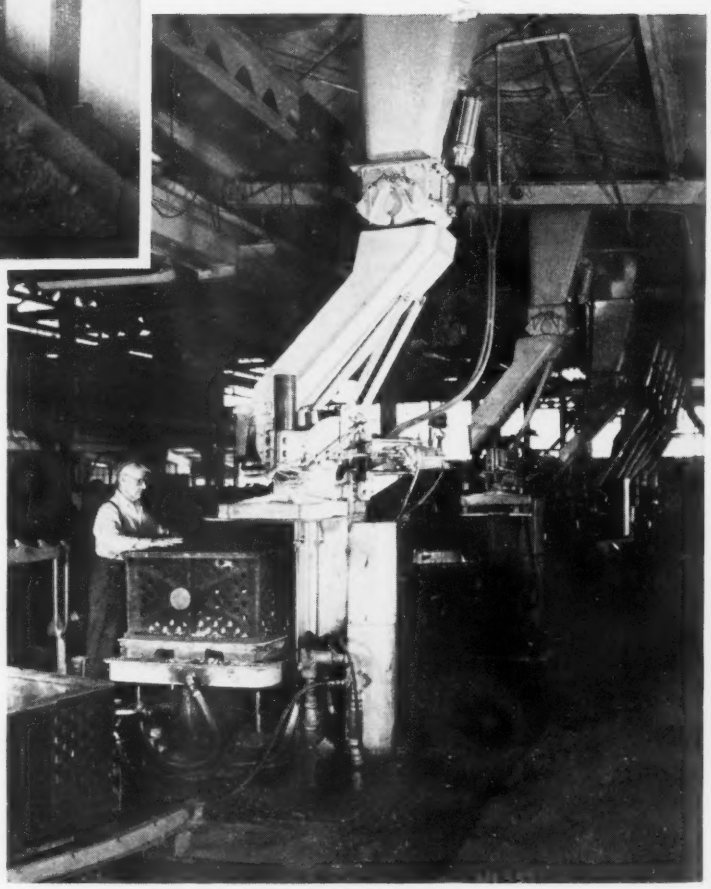
it's New . . . it's Electronic . . . it Cuts Costs



JEFFREY AUTOMATIC PLOW

FEMA



Here's another step toward greater mechanization of foundry production. Jeffrey's new automatic plow cuts costs by saving man-hours and preventing down-time. It is electronically controlled to assure continuous supply. Its probing action provides utmost efficiency in mechanized production.

Top view shows prepared sand delivery belt and Jeffrey Automatic Plow over hopper.

At right: **Molder feeds sand to flask through Jeffrey Clamshell Valve from hopper kept full by new Jeffrey Automatic Plow.**

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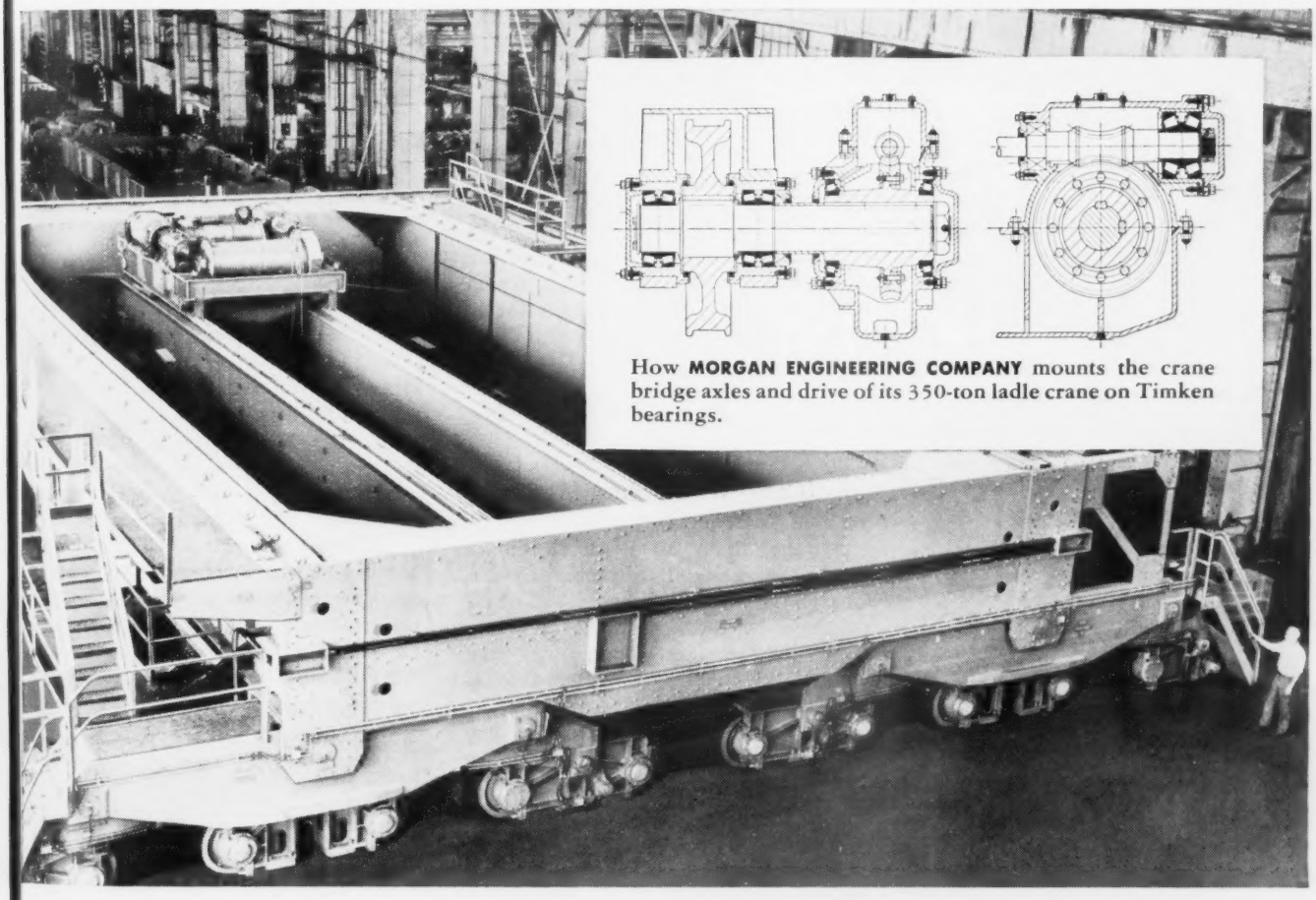
THIS giant ladle crane designed and built by the Morgan Engineering Company has to be rugged to handle loads as heavy as 350 tons. That's why Morgan engineers mounted the crane bridge axles and drive on Timken® tapered roller bearings.

By using Timken bearings, they solved two load problems: the heavy thrust loads on the axles caused by the pendulum swing of the ladle and the continual heavy radial loads resulting from the weight of the full ladle. Timken bearings take any combination of radial and thrust loads easily because of their tapered construction. They hold shafts rigid, prevent gear wear. Line contact between their rollers and races gives Timken bearings a reserve of load-carrying capacity.

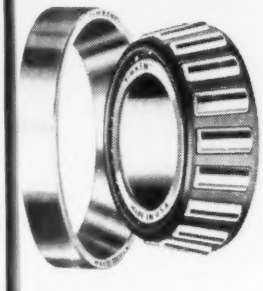
Just as this crane was designed for rugged service, so are Timken bearings. Made of Timken fine alloy steel, they have a hard, wear-resistant surface, and a tough, shock-resistant core.

These are some of the reasons Timken bearings normally last the life of the equipment they're in. Whether you build equipment like this crane, or buy it, make sure the trade-mark "Timken" is stamped on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

TIMKEN BEARING EQUIPPED — *This symbol on a product means its bearings are the best.*



How **MORGAN ENGINEERING COMPANY** mounts the crane bridge axles and drive of its 350-ton ladle crane on Timken bearings.



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with ASSEMBLED BOTTOM PLATES

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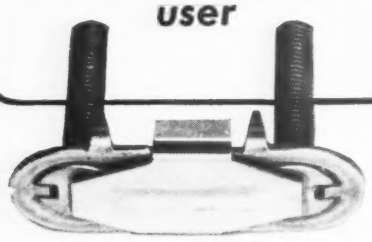
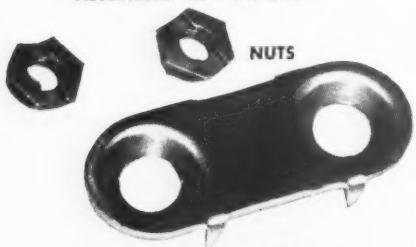
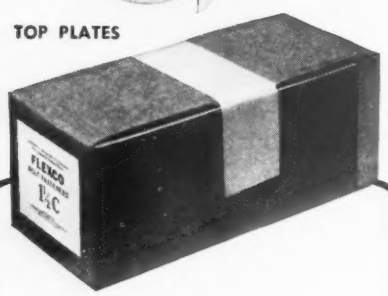


ASSEMBLED BOTTOM PLATE



NUTS

TOP PLATES



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Readers' Comment

Wants More Practical Articles

TO THE EDITORS:

This is a letter with a dual purpose, one to make a suggestion and the other to ask a favor.

Numerically speaking, I and others in the same boat constitute the vast majority of foundrymen. We are the average, the small man, the one and two man shop, the bench molder, the helper, the plugger, the wage earner. Your magazine does not talk to us. More important, it does not talk our language. We are always anxious to learn about our trade, the technical advances, the reports, etc.; but you speak way above our heads. You use words like "aspiration of gases," "dendritic growth," "force of adhesion," and many others. How about a teeny weeny bit of regular article addressed to us in just plain everyday, down-to-earth, easy-to-understand language. We are anxious to learn and you can help us.

I would appreciate a reprint of the article, "Pyrometry in the Nonferrous Foundry," by Robert A. Colton, which appeared in the February and March, 1951 issues.

ALEX E. GROSSMAN
American Casting Co.
510 W. 25*th St., New York*

* * *

Disagrees With Gating Method

TO THE EDITORS:

In the June issue of FOUNDRY (page 135) I found an interesting discussion on the manufacture of brass castings in the Questions and Answers Department. There was one part of the reply portion that I could not let go by without comment.

In the diagram illustrating a proposed method of gating small brass knobs which are to be poured around steel shafts, a sprue is used in the geometric center of the flask. To the best of my knowledge, this practice frequently leads to casting defects because of the necessity of holding the crucible or ladle high above the mold to pour. This in turn causes turbulence or agitation of the metal entering the mold and may well result in dross or sand inclusions in the castings.

It seems to me it would be far better to put the sprue at the end of the flask where it can be poured with the lip of the crucible close to the sprue, giving a minimum of turbulence or agitation. Necessity for quiet pouring is greater with high-zinc type copper alloys than with any other kind. Danger of ending up with dross inclusions or other surface imperfections is always greater with the zinc brasses, and for this reason it is most important that they be poured non-turbulently.

I believe the type of gating illustrated has proved to be impractical in making quality castings not only because of the placement of the sprue but because far too many castings have been placed on the plate. Experience has indicated that an excess of castings on the plate usually results in a higher rate of scrap; particularly in this case, trouble could be anticipated with the castings directly in line with the sprue. With the high kinetic energy of the metal as dropped from a crucible, necessarily held well above the mold, there would undoubtedly be excessive dross and turbulence, especially in those castings nearest the sprue.

R. A. COLTON
Federated Metals Division
American Smelting & Refining Co.
Barber, N. J.

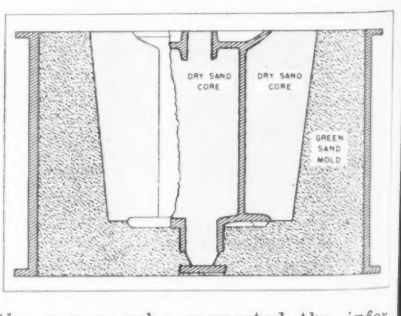
* * *

How To Mold a Winch Drum

TO THE EDITORS:

Looking through the Questions and Answers in the April issue, I was interested in the sketch of a method of making a winch drum.

As you know, I was with Sullivan Machinery Co. for many years, and since we made all sizes of hoists, you can realize we cast many thousands of drums of all sizes. Therefore I felt the enclosed sketch (free-hand, not to scale) could be of value to



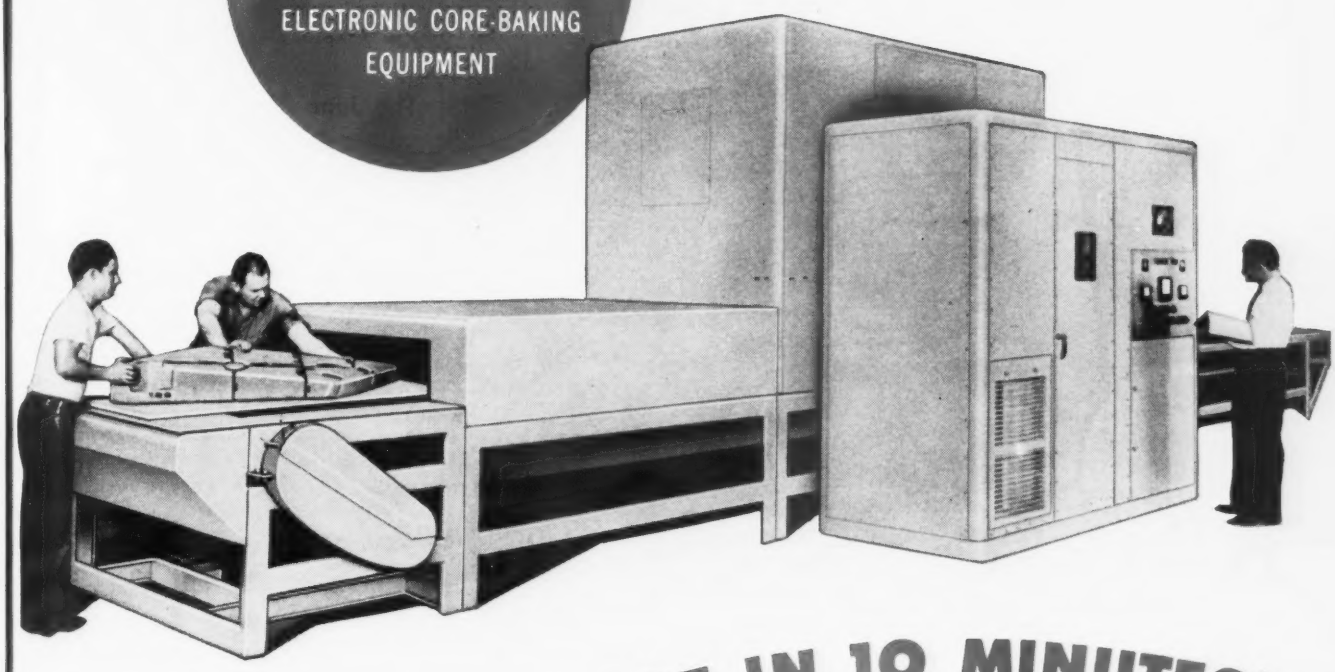
the person who requested the information. This method is simple and very satisfactory. Using the scheme anyone can make these castings by hand or machine production.

The center core is made in two halves and pasted and wired together. It is held down by stem chaplets

(*Continued on page* 80)

Thermex

ELECTRONIC CORE-BAKING EQUIPMENT



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CESCO **FOR SAFETY**

(*Continued from page* 78)

through the cope, and is supported by a bearing plate. The casting can be gated on either the hub or the flange. Draft between the outside core and the mold is 5 to 7 degrees.

JOE PENDERGAST
Foundry Specialist

Mutual Security Agency
Via Veneto, Rome, Italy

* * *

The June Front Cover

TO THE EDITORS:

In the last issue of FOUNDRY there appeared on the front cover a group picture of a patternmakers' meeting that was held during the convention. Could you give me the name and address of the photographer so that I could order one of these photographs.

Harold Brakeman, president of the City Pattern Works, appears in the front row of this group. I would like to present this photograph to Mr. Brakeman, as I was responsible for getting him to join the Central New York Chapter of the American Foundrymen's Society. Since he joined he has been very active in our Chapter and I would like to present him with this picture as a souvenir of his first meeting at a convention.

This was an excellent picture and I have received many favorable comments from our chapter members in Syracuse.

WILLIAM D. DUNN
Assistant to the President

Oberdorfer Foundries Inc.
Syracuse 1, N. Y.

* * *

Helping Turkish Foundrymen

TO THE EDITORS:

I was very much impressed with Mr. Henderson's comments and viewpoints on the foundry situation in Turkey, published in your "Reader's Comments" section of your February issue.

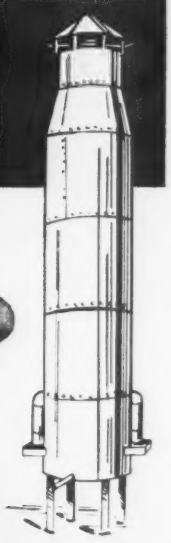
I have been stationed in Turkey for the last nine months and I contemplate staying here for another three months. I am rated as Quarterman Molder, Foundry Specialist, working for the United States Navy Department and loaned to the Turkish Navy. My job is to advise and instruct these people in all phases of foundry work. In my twenty-nine years of foundry experience this has been my most difficult assignment, but also my most interesting.

I knew that the sands they use in these shops could not be compared with our sands in the United States but I was sent here to help them do the best job possible with the ma-

(*Concluded on page* 82)

"Buffalo"

CUPOLA BLOWER



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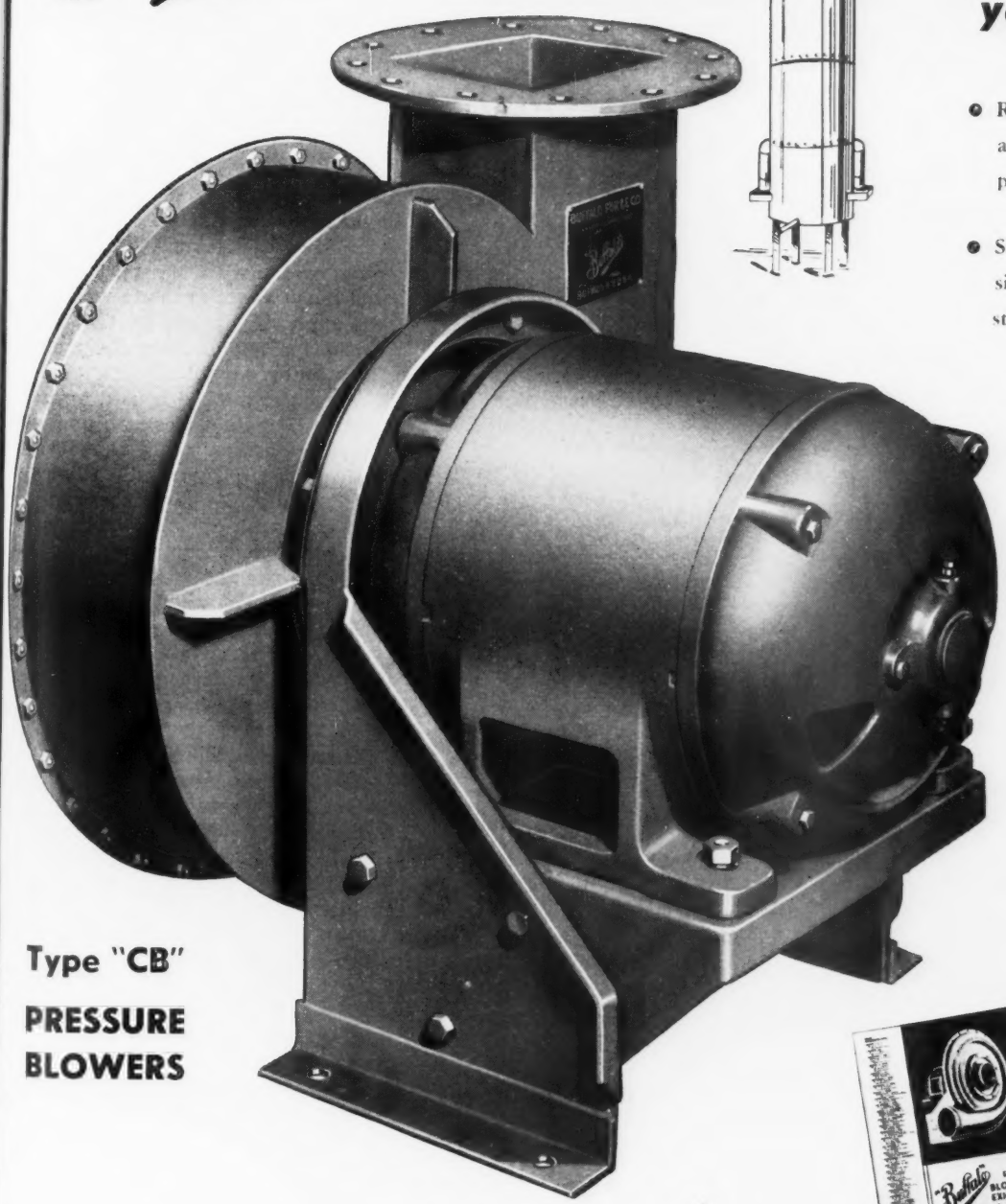

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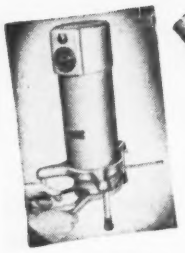
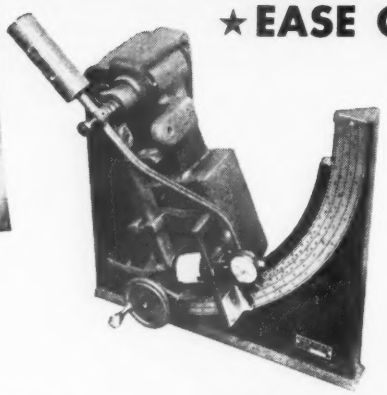
★EASE OF MOLDING

Improves with moisture, green strength, deformation and flowability control.



MOISTURE



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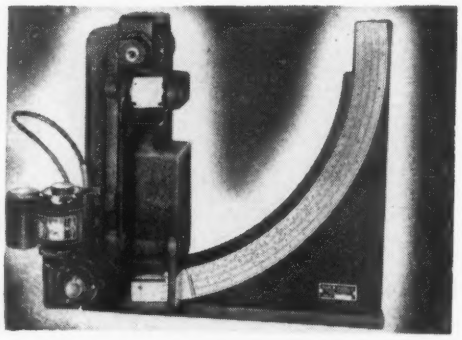
★CASTING CLEANLINESS

Improves with hardness, air-set and dry strength control.

MOLD HARDNESS

AIR-SET AND DRY STRENGTH ➔



★CASTING FINISH

Improves with sand grain size and distribution control.

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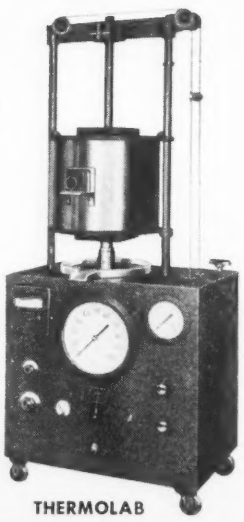
Improves with hot strength and hot deformation control, which insures freedom from mold wall and core failure at pouring temperatures.



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(*Concluded from page* 80)

terials at hand. I would have appreciated and welcomed any help or comments offered by Mr. Henderson. I was informed some time in January that Mr. Henderson was to have paid me a visit and I was somewhat disappointed when this visit never materialized.

The Istanbul sand which he said is so bad is the only sand I have to work with, and after analyzing it, I found it to be low in silica and high in clay content. However, I have managed to produce iron castings from 1 pound to 10,000 pounds in weight, free of scabs or rough surfaces. The latter was accomplished by simply using four parts old sand to one part new sand as facing. No binders of any kind are used. After the mold is finished, we mix five parts water with one part molasses and make a wet graphite wash. Then we apply this wash to the surface of the molds and place the molds in the oven over night.

The latter method is used for heavy casting. For light work we apply dry graphite on the surface of molds. All molds are well vented to increase permeability. We have experienced no difficulty with our nonferrous metals and have made castings up to 4000 pounds in weight.

I have been working blind, so to speak, not having any laboratories in which to test metals or sands. Upon occasion I have sought and received advice from my friend Chester Swanson, Master of the Foundry at the Boston Naval Shipyard. He has had metal samples analyzed for me and when I was confronted with various problems he rendered his services freely and generously in an advisory capacity through the medium of the mails. I wish to take this opportunity to publicly thank him for his assistance.

I agree with Mr. Henderson 100 per cent, on the way these people are willing to devote all their efforts toward preserving their freedom, and I additionally recognize the high regard in which they hold the people of the U. S.

I, for one, am proud to have had the privilege and experienced the pleasures commensurate with working and living in this fine country. I feel sure that any aid we extend to the Turkish nation is met with a deep and sincere appreciation. It would be a great mistake to labor under the misunderstanding that any money spent here in Turkey would be a loss.

RAPHAEL P. MASSARO
Quarterman Molder,
Foundry Specialist
Boston Naval Shipyard

What it takes to make a 3000 Degree Refractory Concrete

Because of the widespread interest in the use of refractory castables, many furnace operators have asked us for the story behind the performance of B&W's unique refractory concrete, Kaocast.

Here are the answers to some of the most frequently asked questions:

Q. *When you refer to Kaocast as a 3000 degree refractory castable, do you mean that its melting point is 3000° F?*

A. No, this means that its service use limit is 3000° F; its melting point is 200 degrees higher.

Q. *Just what does it take to make a 3000 degree refractory castable like B&W Kaocast?*

A. Let's first define a few terms. Refractory castables are made with granular materials which are volume stable at high temperatures and which can undergo repeated heating and cooling cycles without disintegration. These materials, known as refractory calcines or grogs, are blended with suitable hydraulic binders. The initial strength of a refractory castable is thus developed in the same manner as that of ordinary concrete—that is, through the chemical action between water and the binder. A strong *ceramic bond* is formed when the refractory castable is subjected to temperatures above the vitrification point.

Q. *Then you have a grog, a binder and a method of putting them together. Which is most important?*

A. You can't say that any *one* is most important. It's a combination of all three. Let's take them one at a time. Our grog consists primarily of the proper blend of kaolin and other alumina-silica materials. This ratio enables us to achieve a grog with minimum expansion and shrinkage, a high fusion point, and greater stability under load, at varying temperatures.

Q. *And now, what about the binder?*

A. There are a number of factors responsible for the success of the Kaocast binder. One is the compound Tricalcium Penta-aluminate (3 lime to 5 alumina). This formula produces the most refractory compound (highest melting point) that can be made from lime and alumina. Another is that by using the purest commercially available lime and alumina, the Kaocast binder is substantially free of iron and silica. Such traces of these that are present combine during the prefiring of the binder to produce stable compounds.

Q. *Just how important is the manufacturing or "blending" of the grog and the binder?*

A. If one factor could be singled out as "most important" it would be quality control.

Direct control over the fineness of materials, prefiring temperatures, and other phases of manufacture is possible at B&W because both the grog and the binder are made and blended at B&W's Augusta Works—under B&W's direct control and supervision.

Q. *These factors you've discussed must add up to some specific advantages of Kaocast. What are they?*

A. B&W Kaocast has all the advantages of easy installation which are responsible for the widespread interest in refractory concretes, plus these exclusive features: It is the only 3000 degree refractory concrete with high resistance to spalling and low volume change throughout its operating range.

THE BABCOCK & WILCOX CO.
Refractories Division
General Offices:
161 East 42nd St., New York 17, N. Y.
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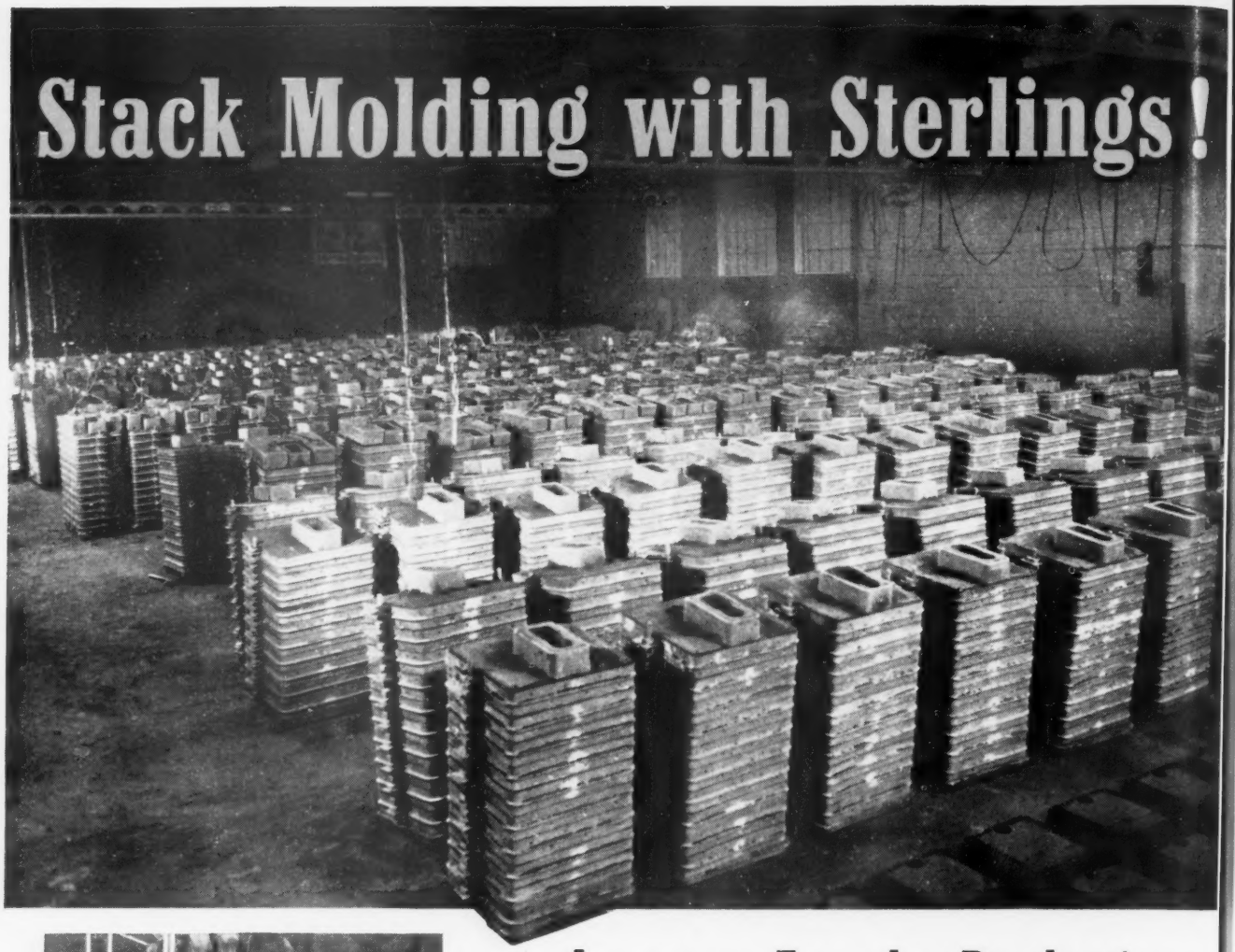
Stack Molding with Sterlings!



Pouring Metal into Stack Molds
In this modern foundry, molds are made in Sterling Steel Flasks stacked one above another, to a height of 10 or 12 sections. A common sprue, through each stack, feeds molten metal to runners leading to individual casting cavities.

★ *Improves* Foundry Production
★ *Steps Up* Casting Output
★ *Saves* Valuable Floor Space

Progressive foundrymen select Sterlings for modern stack molding operations. Why? Because they can step up casting production even in comparatively small quarters. Sterling Flask sections are "tailor-made" for stack molding operations. They are carefully fabricated from special hot rolled channel steel having a tensile strength of 70,000 lbs. The steel also has controlled carbon content and copper bearing... features that enable the flasks to withstand tremendous pressures. And they retain their rigidity and accuracy under constant production pressure. All types and sizes to meet your individual needs. Write for catalog.

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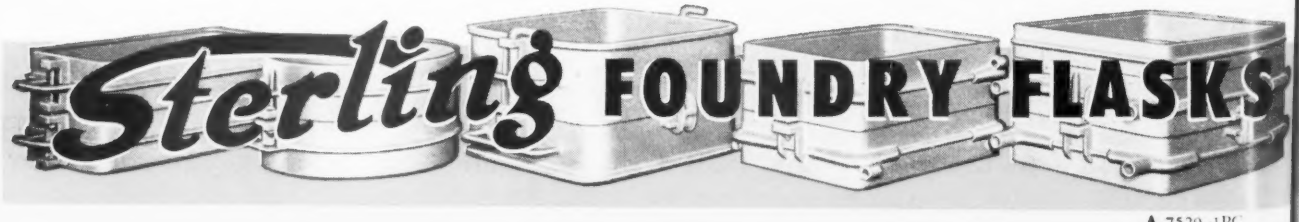


A 7529-1PC

How Are YOUR Prices?

As demonstrated on numerous occasions, increases in the cost of labor or materials to basic industries, such as steel and aluminum, are reflected quickly in the price of commodities produced by those industries.

In the main, this does not apply to producers of castings. Among foundries, price cutting appears to be the scourge that weakens the economic stability of many concerns, and makes the going exceedingly tough on occasion. Examples were plentiful at the beginning of World War II and the Korean War when the application of a retroactive price freeze found a sizable number of concerns in a difficult situation.

Who cuts prices? Ask almost any foundryman and he probably will tell you that everybody cuts prices—except him. And the next fellow you talk to will give the same answer.

Of course all foundry operators are not price cutters. Many producers of castings are making a quality product, know costs, operate efficiently, have good salesmen and understand the meaning of a fair profit. These plants are too busy serving their customers and developing new outlets for castings to be very much concerned with price cutting.

On the other hand, there are organizations who lack an understanding of the potentials for expanding the market for castings and are content to cut prices, swap patterns and realize a poor financial return. Of course, price cutting does not refer to competition based on sound cost accounting.

Nothing can be gained by unrealistic price cutting. In fact, if the profit return to the foundry industry were to equal that for all manufacturing, an increase of from 10 to 15 per cent in selling prices of castings would be justified.

More attention to product, methods, competent personnel, selling and market expansion on the part of many operators should go a long way in improving the pricing situation of the industry.

Let's quit sharpening pencils!

Frank G. Steinbach

Editor

How To Specify CONVEYOR BELTING For Foundry Applications

Normal and high-temperature service requirements, and the considerations which make belt selection a matter of compromising desirable characteristics, are discussed along with tables and formulas to assist foundrymen in closely estimating conveyor belting needs for a proposed installation

By ROBERT H. HERRMANN
Associate Editor

SPECIFICATION of conveyor belting for foundry applications can be divided into two main categories: First, normal temperature service in which belt selection is based on well founded general principles applicable to conveyor belts in all low temperature work, and secondly, applications involving extremely high temperatures, such as in shakeout belt installations.

Service in the first category includes the transportation of new and prepared core sand or strike-off, reworked and new molding sand at temperatures which seldom exceed 180° F. Impact is negligible and abrasion is low, resulting mainly from the use of plows or scrapers to remove material from the belt. Other uses in this category include the movement of green and dry cores and the transportation of cold castings in process of finishing, inspection, or sorting.

High-temperature applications usually involve movement of dumped molds and castings to automatic shakeout and hot sand away from shakeout. Sometimes freshly screened rework sand from the shakeouts will have a temperature in excess of 180 but below 250° F. A medium grade high-temperature belt would serve in this capacity. For the hot sand from freshly dumped molds, containing hot castings or parts thereof, the highest grade hot-temperature belt is preferable.

Since belt life generally is inversely proportional to temperature, no belt can be expected to have a long life when required to handle materials at high temperature compared with normal low temperature handling installations even though high-temperature belts are compounded to resist the effects of heat better than general purpose belts. Sometimes this is done at the expense of abrasion resistance and other characteristics. Thus, belt choice becomes one of comparative economics rather than absolute values in total tons carried.

Because of the variable factors of heat, maintenance, loading conditions, and other operational considerations, the establishment of any maximum temperature or abrasion resistance standards is difficult. Identical belting on the same application in different foundries might give widely different service. In the opinion of one belting man, most belt failures in foundries result from abuse, tearing or burning. They seldom wear out in terms of normal belt life expectancy.

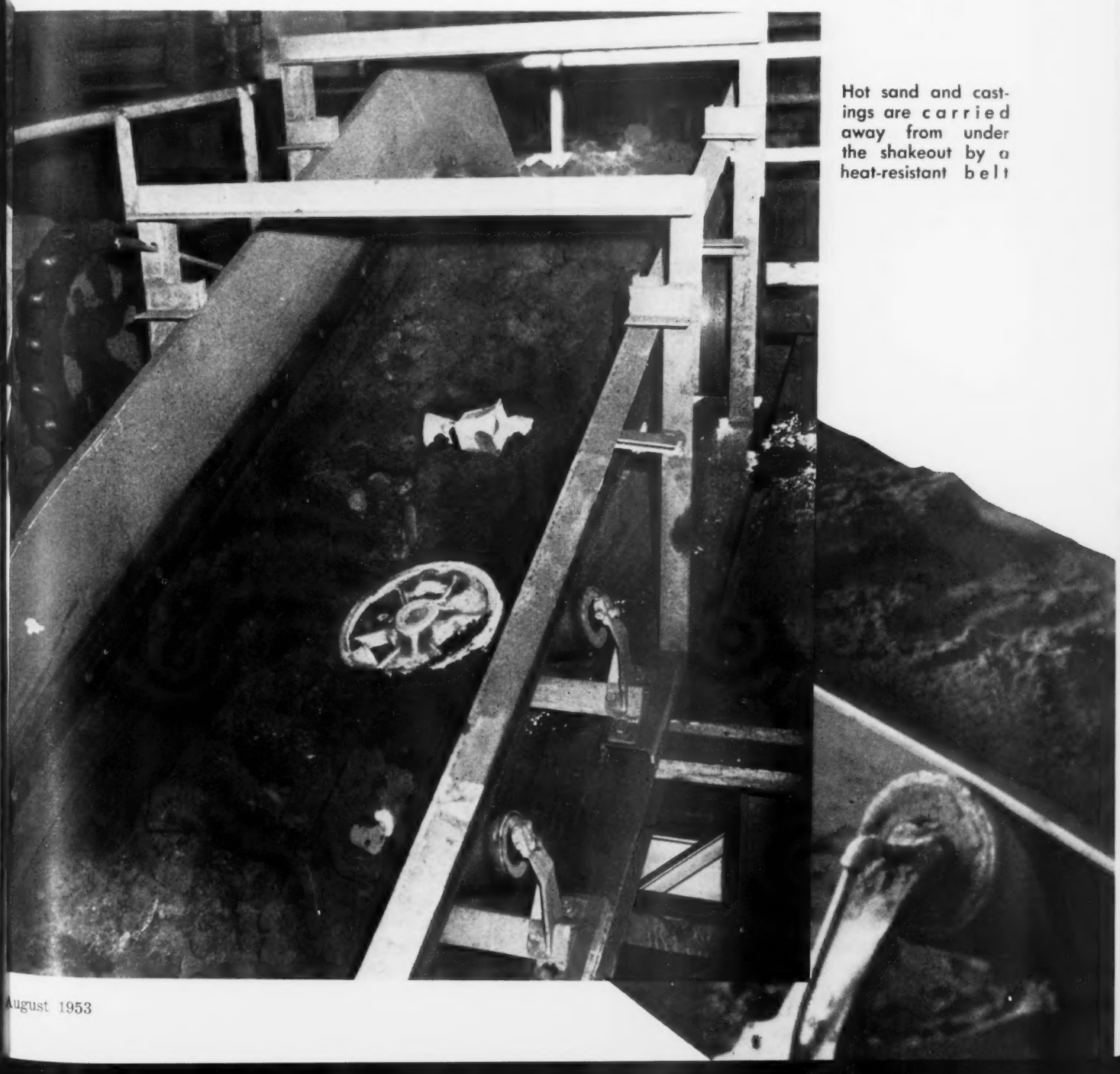
Another point to be considered is the difference be

tween the maximum temperature of the material carried and the temperature throughout the belt carcass. A belt carrying material at 250° F but operating in a relatively low ambient temperature, say 100° F, may have an average belt temperature below 200° F. Such a belt probably would outlast by several times a similar belt carrying similar material in an atmosphere at 250° F. Similarly, the relative density and fineness of the hot load affects belt life. It is not hard to realize that sand at 250° F would have a much more severe baking action on the belt than a less dense material at the same temperature.

Not only is sand at elevated temperatures handled at the shakeout, but red hot chunks of metal, either as castings or broken off sprues and risers, often come in direct contact with the belt. When they do, they can burn a hole right through an ordinary belt. Occasionally a piece of metal will start to burn its way through the belt, and become caught in it. As the belt travels over the idlers, the projecting metal piece catches on the machinery and rips the belt over long lengths before the conveyor can be stopped. A method often used to prevent extreme belt ripping is to place strips of steel wire in the carcass, transverse to the line of travel.

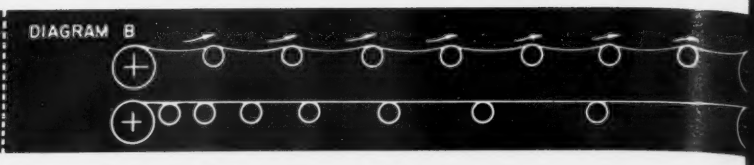
Types of Belt Used—Two major classes of conveyor belts are used widely in foundries. One is composed of woven cotton duck impregnated with chemical compounds which provide the necessary physical characteristics required for the particular type of service desired. Those compounds waterproof, lubricate, toughen, or otherwise condition or protect the fabric base. In the better quality belting these impregnating compounds usually saturate all the fibers of the fabric thread, preserving the basic fabric and improving the wearing qualities of each of the plies.

Fabric belting is made up of a core of varying numbers of plies stitched together with a cover applied around the core; the entire belt, core and cover, is stitched together. The number of plies and type of

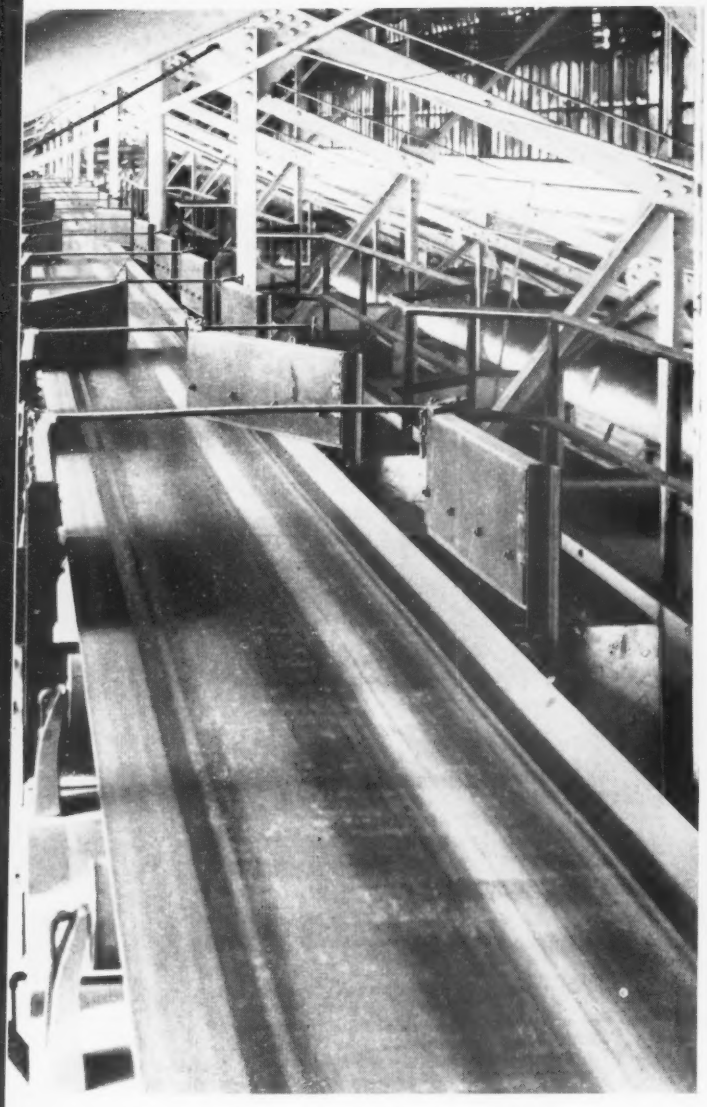


Hot sand and castings are carried away from under the shakeout by a heat-resistant belt

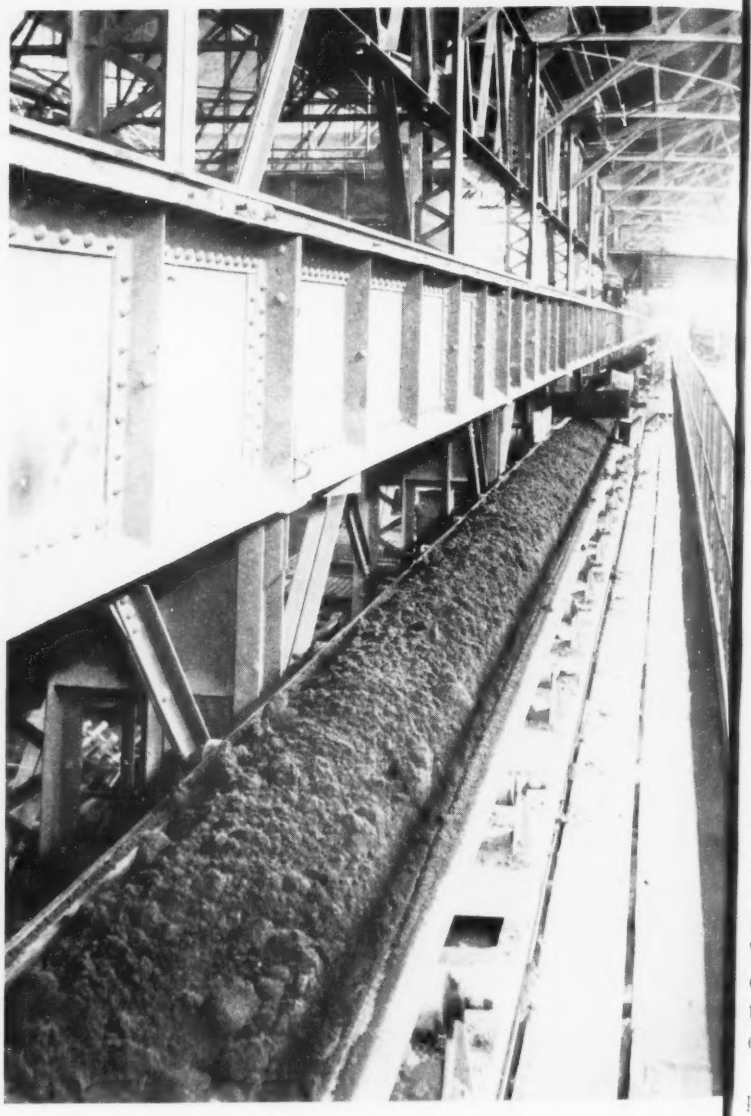
Belt troughing is aided by step ply construction



Graduated idler spacing stops belt sag. Drive pulley at right



Prepared sand is plowed off this flat overhead conveyor belt to molders' hoppers below



This flat distributing belt conveyor is 500 ft long and has a capacity of approximately 100 tons per hr of tempered sand

impregnating material is determined by the service for which the belt is intended. Better quality belts usually are stitched in such a manner that the stitching will not "run" if a thread is broken or cut, but will continue to hold the plies securely together throughout belt life.

Belts for high-temperature use sometimes incorporate in the fabric asbestos and other insulating and heat resisting materials in addition to elevated-temperature-resisting impregnants.

Fabric belting is adaptable to all foundry applications—movement of castings, scrap, coke, cores, bonding materials and sand. For high-temperature use, one manufacturer furnishes a belt designed to withstand sustained heat of 450 to 600° F. Heat resistance of this belt is obtained by combining asbestos and a special insulating member with the cotton base. It has two plies of asbestos and two insulating members on the carrying side. Top cover is treated to harden it and increase abrasion resistance. Periodical application of a special surfacing compound replenishes the original heat-resisting campound gradually lost in service and prolongs life of the belt.

Another heat-resisting belt has been developed for use under infrared lamps for the drying of core washes or painted castings. Presumably belting of this type also would be suitable for use in dielectric core drying ovens.

Typical drive arrangements used on belt conveyors

Examples of take-ups used to maintain belt tens

Rubber Belting Widely Used—Rubber belting, like fabric belting, is adaptable to all foundry applications. Various types are available, each designed for a specific application. They range from all rubber to rubber-covered fabric carcasses, the carcasses being made up of multiple plies of varying fabric compositions.

The most commonly used belts have carcasses containing multiple plies of various weights of cotton duck. Weight of duck is based on a linear yard, 42 in. wide, and weights range from 28 to 48 oz. Plies in the belt are held together by "friction," which is a coating of rubber between the layers and which also impregnates the ply fabric. Some manufacturers add chemical antioxidants to temper the rubber used as "friction" and keep it "live" and resilient.

Sometimes an extra coating of rubber known as "skim" is put between the plies. It increases flex life of the belt many times by creating a more elastic link to which duck anchors firmly. Plies are able to flex with less danger of separation. It also serves to cushion the fabric against impact in loading.

Belts intended for severe service often have a breaker strip inserted just under the top cover. It may be a single layer of open-mesh fabric impregnated with rubber. It may be a layer of parallel cords imbedded in rubber, the cords being placed across the width of the belt. Such a breaker strip is said to increase adhesion of cover to carcass in addition to increasing impact resistance. For belts intended for hot service longitudinal nylon breaker cords are used. They run the length of the belt, and as the rubber cover gets hard and cracks in hot service the cords tend to hold the cover together, preventing severe cover checking and loss of cover adhesion.

Other belts incorporate a number of cord plies in place of fabric plies. They are said to have extra strength and wear resistance and are intended for extra heavy, long range service. Some belt constructions make use of flexible steel cables imbedded in the belt. They run with the length of the belt and permit use of ultra high belt operating tensions. The use of strands of high-tensile steel wire imbedded in a belt across its width at regular intervals of a few feet has proved successful in reducing the length of tears in belts in those occasional instances when a foreign object punctures the belt. These belts have been used in foundries for carrying shakeout sand which sometimes contains hot, sharp pieces of metal.

Where service conditions require a belt to resist severe wear and still offer maximum lateral flexibility for troughing, step ply construction is used. In this construction, plies are stepped down toward center of the belt, allowing additional rubber at middle of belt to permit extra wear without exposing the fabric. See diagram A, which shows principles of construction.

Many other special belt designs are available, including one with flanges to prevent material slipping off sides of belt.

Belt carcasses are enclosed in a rubber cover that protects them against dirt, grit and moisture and against loading and other abrasive action to which it is subjected. Edges of the belt also are sealed.

The average pulley side or bottom cover is 1/32 to 1/16-in. thick for smaller belts operating under favorable conditions and 3/32 or 1/8-in. thick for belts 36 in. wide or wider. The thicker bottom cover sometimes is used on smaller belts where highly abrasive conditions or excessive wear are encountered. Carrying side or top covers usually fall within the range of 1/16 to 3/8-in. depending upon the number of minutes it takes the belt to make a complete revolution and the severity of abrasive action.

Recent advancements in construction of rubber belts for high-temperature use have incorporated high-grade heat resisting rubber compounds in combination with a glass or asbestos fabric carcass. The glass combination gives a relatively expensive belt, initially, but one that will save considerable money in ultimate cost when properly selected to suit the job. The advantages are that red hot lumps are less apt to burn their way through the belt carcass, and the glass fabric does not lose its tensile strength when held at elevated temperatures for extended periods of time.

Glass Yarns Resist Heat—The use of glass yarns in combination with other reinforcing textile yarns is said to provide effective reinforcement for hot materials conveyor belts because it combines good rubber adhesion with good strength under heat—90 per cent of original strength at 450° F.

One manufacturer produces a conveyor belt consisting of a central portion of glass-fabric-reinforced members combined with cotton and asbestos layers totaling six plies. The standard thicknesses of rubber covers on these belts are 3/16-in. top and 1/16-in. bottom. The asbestos layer directly under the top cover is used for its good bulk factor and good insulating properties. The cotton ply next to the pulley cover furnishes additional bulk at low cost. Intermediate carcass construction consists of layers of woven glass fabric suitably blended to furnish good lengthwise and transverse reinforcement.

This belt is recommended for installations where temperature of the material averages about 250° F with some hot lumps running well above that temperature. Another manufacturer makes a belt consisting of glass fabric plies with a longitudinal nylon cord breaker floated in the cover. It has handled 500° F sand successfully in cool, circulating ambient air.

TABLE I—Normal and Maximum Recommended Belt Speeds

(Feet per minute)

Type of Material Handled	Belt Width, in. 14	16	18	20	24	30	36	42	48	54	60
Normal speed	200	200	250	250	300	350	400	400	400	450	450
Coke	250	250	300	300	350	350	400	400	450	450	500
Wet or dry sand	300	300	350	350	400	400	450	450	500	550	600

TABLE II—Capacity of Troughed Conveyor Belts

(100 fpm belt speed)

Belt Size	Prepared Sand (75 lb per cu ft) Tons per Hour	Unprepared Sand (100 lb per cu ft) Tons per Hour	Unprepared Sand (100 lb per cu ft) Maximum Lump Size, in. (10% Lumps)	Coke (30 lb per cu ft) Tons per Hour	Coke (30 lb per cu ft) Maximum Lump Size, in. (All Lumps)
14	24	32	3	10	2
16	31	42	4	13	2½
18	40	53	5	16	3
20	50	67	7	20	3½
24	73	98	9	29	4½
30	118	158	12	47	6
36	175	233	15	70	8
42	245	326	18	98	10
48	328	438	21	131	12
54	426	569	24	171	14
60	540	720	28	216	16

TABLE III—Minimum Belt Width for Troughed Belt Conveyors Handling Lumps of Various Sizes

Belt Width, in.	Uniform Size Material, in.	Lump Size with 90% Fines, in.
14	2	3
16	2½	4
18	3	5
20	3½	7
24	4½	9
30	6	12
36	8	15
42	10	18
48	12	21
54	14	24
60	16	28

TABLE IV—Horsepower Required for Empty Horizontal Conveyor for Each 100 fpm belt speed (antifriction bearings)

Belt Width in.	Center to Center Length in Feet 50	100	200	300	400	500
14	.27	.34	.48	.61	.75	.89
16	.29	.36	.51	.65	.80	.95
18	.35	.43	.60	.78	.95	1.12
20	.38	.48	.67	.86	1.05	1.24
24	.45	.57	.80	1.02	1.25	1.48
30	.62	.77	1.08	1.39	1.70	2.00
36	.80	1.00	1.40	1.80	2.20	2.60
42	.91	1.14	1.59	2.04	2.50	2.95
48	1.07	1.34	1.88	2.41	2.95	3.49
54	1.24	1.55	2.16	2.78	3.40	4.02
60	1.38	1.73	2.42	3.11	3.80	4.49

TABLE V—Horsepower Required to Convey Material Horizontally—Any Speed, Any Material (antifriction bearings)

Capacity, Tons per hr	Center to Center Length in Feet 50	100	200	300	400	500
50	.3	.4	.5	.7	.8	1.0
100	.6	.8	1.1	1.4	1.7	2.0
200	1.2	1.5	2.1	2.7	3.3	3.9
300	1.8	2.3	3.2	4.1	5.0	5.9
400	2.4	3.0	4.2	5.5	6.7	7.9
500	3.0	3.8	5.3	6.8	8.3	9.8

TABLE VI—Horsepower Required to Elevate Material or Generated in Lowering It

(Any material, any speed. No drive loss or belt slope tension included in these figures)

Belt Capacity Tons per hr	Lift or Drop in Feet 5	10	20	30	40	50
50	.3	.5	1.0	1.5	2.0	2.5
100	.5	1.0	2.0	3.0	4.0	5.1
200	1.0	2.0	4.0	6.1	8.1	10.1
300	1.5	3.0	6.1	9.1	12.1	15.2
400	2.0	4.0	8.1	12.1	16.2	20.0
500	2.5	5.1	10.1	15.2	20.0	25.0

TABLE VII—Effective Tension for Various Horsepower and Belt Speeds

Horsepower	Speed in Feet per Minute 100	150	200	300	500
1	330	220	165	110	66
5	1650	1100	825	550	330
10	3300	2200	1650	1100	660
20	6600	4400	3300	2200	1320

Selecting the Right Belt—Selection of the proper belt for any application is determined by several factors. As in so many other pieces of equipment, first cost alone should not be a deciding factor. Length of service, amount of downtime for repairs, adaptability to the application and other factors are important considerations. The choice should be based upon requirements for the application and the cost should be figured on the basis of amount of satisfactory service per hour, week, or month of operation or on the number of pieces or amount of material handled.

For example, consider the experience of a foundry which installed a woven fabric belt to convey hot sand and castings from the knockout. Plant officials figured that this belt would more than pay for itself if it lasted only 30 days but if, during that period, it eliminated conveyor shutdowns which cost $750 per

TABLE VIII—Drive Factors for Computing Slack Side Tensi

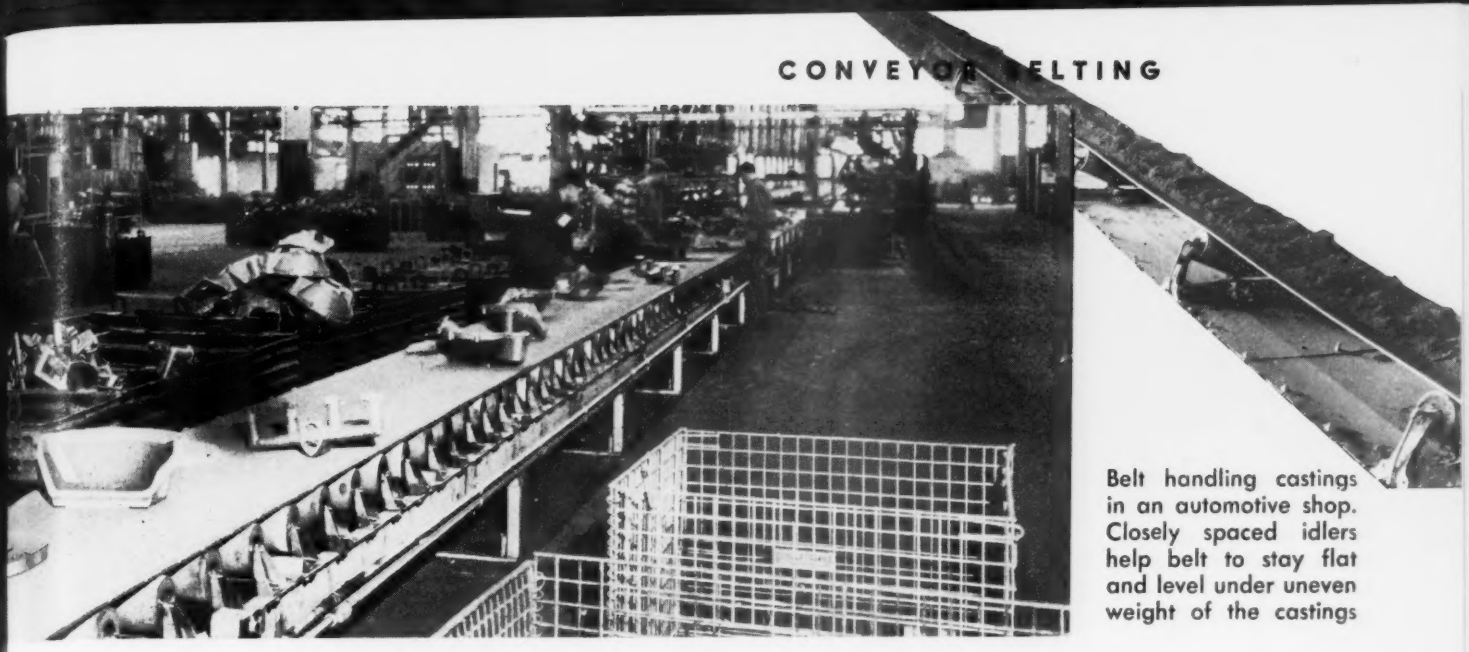
Arc of Contact	Screw Take-up Bare Pulleys	Screw Take-up Lagged Pulleys	Automatic Take-up Bare Pulleys	Automatic Take-up Lagged Pu
180° (plain drive)	.97	.80	.64	.50
215° (snubbed drive)	.78	.64	.48	.37
420° (tandem drive)	.36	.30	.13	.09

TABLE IX—Minimum and Maximum Numbers of Plies fo Troughed Belts Handling Various Materials

Belt Width, in.	Minimum Plies To Support Load—Coke 28 oz. duck	Coke 32 oz. duck	Sand 28 oz. duck	Sand 32 oz. duck	Sand 36 oz. duck	Maximum Plies for Trou 28 oz. duck	32 oz. duck	36 oz. d
14	3	3	4	4	.	5	4	.
16	3	3	4	4	.	5	4	.
18	4	4	4	4	4	6	5	4
20	4	4	4	4	4	6	5	5
24	4	4	4	4	4	7	6	6
30	4	4	5	5	4	9	8	7
36	4	4	5	5	4	10	9	8
42	4	4	6	5	5	11	10	9
48	4	4	6	5	5	13	12	11
54	.	.	7	6	6	14	13	12
60	.	.	7	6	6	15	14	13

TABLE X—Maximum Tension per Belt Ply

Weight of Duck in Pounds	Belt Width in Inches 14	16	18	20	24	30	36	42	48	54
28	371	424	477	530	636	795	954	1113	1272	1431
32	420	480	540	600	720	900	1080	1260	1440	1620
36	...	...	...	660	792	990	1188	1386	1584	1782
42	...	...	...	...	1008	1260	1512	1764	2016	2268



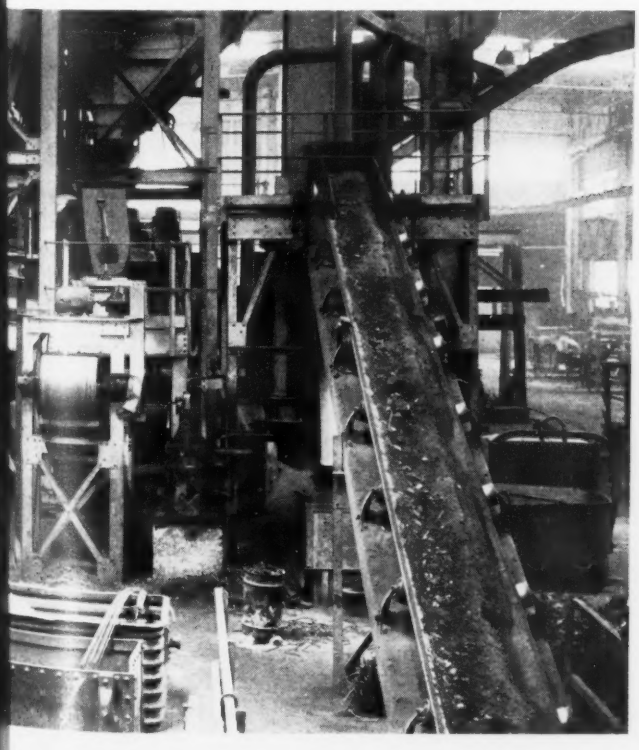
Belt handling castings in an automotive shop. Closely spaced idlers help belt to stay flat and level under uneven weight of the castings

hour. The belt lasted over 12 months without a shutdown resulting from belt failure. Savings in operating expenses during that period amounted to between $30,000 and $40,000. Initial cost of this belt was higher than for belts previously used, but the saving in dollars alone was many times the cost difference.

In another foundry a rubber belt with glass-fiber-reinforced carcass was installed to transport hot sand. At the time of observation it had performed satisfactorily for 3200 hours at a cost of 57 cents per operating hour. Average hourly cost of previous belting installations for the same application had been $1.18, with average satisfactory service of 918 hours.

In determining the type and quality of belting required on specific conveyor installations, the width, speed, length, elevation, pulley diameters and material strength are among the principal elements to be considered.

Hot shakeout sand containing gaggers and other bits of metal is conveyed over a magnetic pulley at top



Also it should be kept in mind that for a given belt width the capacity of troughed belt conveyors is about twice that of flat belt conveyors. Consequently, the use of flat belts in handling bulk materials generally is limited to feeders and to installations where discharge is to be made with plows. Data presented below on belt conveyors are based on the use of troughed belts. Proper allowance should be made when flat belts are being considered.

The correct belt width to handle material containing large lumps depends upon the percentage of fines and smaller particles mixed with the heavier lumps. In general, the size of lumps should not exceed one-third the belt width, and then only if they do not exceed 10 per cent of the load. If lumps are uniform in size they should not exceed 1/5 the belt width. The relationship between belt width and size of material to be conveyed is shown in Table III.

How Fast To Operate?—The speed at which a conveyor belt should be run depends upon the type of material carried and how well the material rides. Other factors to be considered are method of loading, angle of belt incline, and auxiliary equipment. For example, coke, which is easily broken, should be transported at relatively slow speeds. Sand, on the other hand, can be moved at high speed. Also belts may be operated at greater speeds when material is loaded in the direction of belt travel and where inclines are small. Heavy, sharp, and abrasive material should be handled at comparatively low speeds to prevent excessive abrasion at the loading point where the material must acquire the belt velocity. Wear from abrasion in loading is proportional to belt speed.

In general, wide belts can be operated at higher speeds and carry larger lumps of material than specified in the general rule above because the material rides better with less shifting and consequent reduced cover wear. Experience has shown, however, that the most economical operation is achieved by using as narrow a belt as the material will permit and running the belt as fast as the service and loading and discharging conditions will allow. A combination of speed and width should be chosen that will permit

the belt to operate under a full cross-sectional load to promote even belt wear from side to side instead of only in the center.

Table I provides a general outline for normal belt speeds in relation to belt widths and recommended maximum belt speeds for coke and sand.

Belt Capacity—Capacity of troughed belts is determined by belt width, belt speed in feet per minute and weight of material in pounds per cubic foot. Table II gives capacities of various width belts carrying unprepared sand, prepared sand and coke.

Proper belt proportioning is essential for satisfactory conveyor performance. Experience indicates that for various widths of belting constructed with standard weight belt duck there is a limit to the minimum and maximum number of plies that can be used for successful performance. A belt too thin will be too flimsy to carry the load properly or to hold the fasteners. In service it may fold or buckle due to insufficient lateral support or sag between the idlers. Contrariwise, if the belt is too thick it may be so stiff that it will not trough properly and will cause spillage of material and crooked operation. In addition, the weight of duck and number of plies should provide the strength required by the maximum belt operating tension and length of belt.

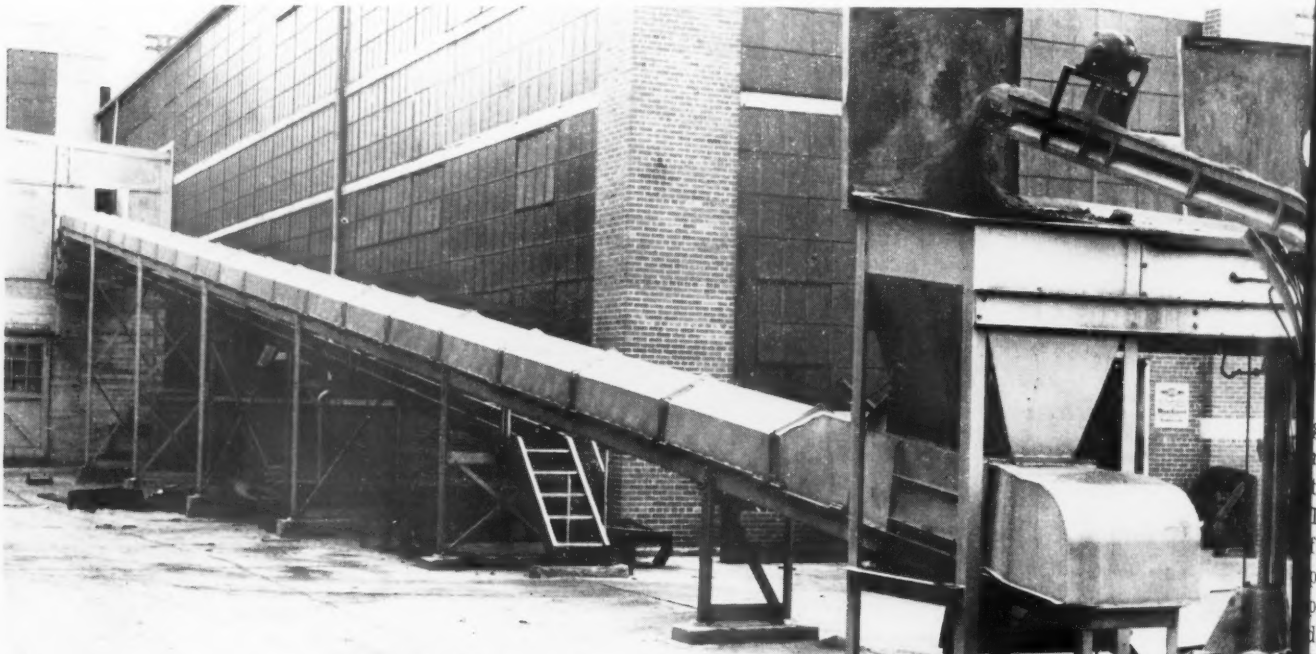
Strength of a belt is limited by the maximum number of plies and weight of duck that can be used without the belt becoming too stiff to trough properly when empty. Proper weight of duck for belt plies depends upon a number of factors such as type and width of belt, type and size of material carried, design of installation, and loading and operating conditions.

Foundry applications usually require 28, 32 or 36-oz duck; the number of plies are indicated in Table IV. Generally the 28 and 32-oz ducks are considered standard. On installations where operating conditions are severe and when belt is heavily loaded, 36-oz duck should be used. Belts subjected to heavy impact and high operating tension usually are made with 42-oz duck, and 48-oz duck is used for long, wide transport conveyors and installations subjected to heavy shock and impact.

The number of plies required in a troughed belt is determined by several factors such as load, class of material handled, pulley diameter, speed, and operat-

Conveyor at right is unloading sand to hopper which feeds covered conveyor leading to storage

Conveyor at right is unloading sand to hopper which feeds covered conveyor leading to storage



Baked cores are unloaded onto a belt which runs on closely spaced idlers past core finishing stations

ing conditions. For proper operation, the belt on a troughed conveyor should touch all pulleys of the idlers. On the average, the maximum number of plies for a given width belt used with properly proportioned idlers is: Five plies for 16 in.; six plies for 20 in.; seven for 24; nine for 30; ten for 36; eleven for 42 and thirteen for 48. (See Table IX.)

If the number of plies required for any given installation exceeds the maximum recommended, consideration might be given to changing the design of the equipment, increasing either the speed, belt width, or drive efficiency, which will permit use of a lower plied belt. This can be done by lagging the drive pulley, using snub pulleys, or changing from a single to tandem drive to increase the arc of contact of belt with drive pulley. Or use of a belt of step-ply construction may solve the problem since it is more flexible and will trough more readily than a straight-ply constructed belt.

Idlers and Pulleys—Troughed idlers are spaced 4 to 5½ ft apart on belts up to 24 in., depending upon weight of material carried. Belts above 24 in. have idlers spaced 3 to 4 ft. Return idlers may be spaced 10 ft apart for belts up to 36 in. wide and 9 ft for wider belts.

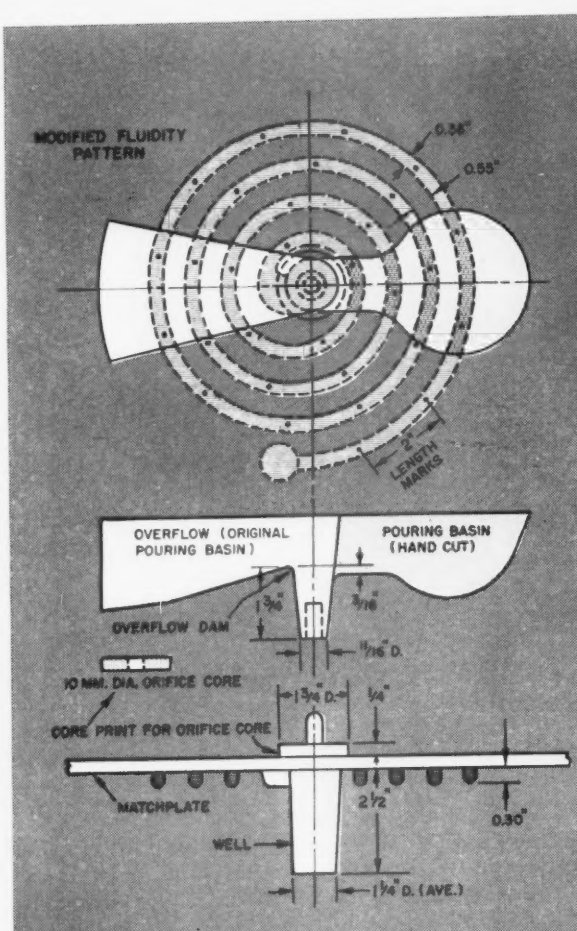
Spacing between load-carrying idlers should be graduated as shown in Diagram *B* to save power and reduce belt wear. The spacing is proportioned to belt tension—the lower the tension, the closer the spacing. Tension on the carrying side of the belt decreases from a maximum at head pulley to a minimum at tail pulley. If 4-ft spacing is adequate at head pulley to prevent excessive belt sag, it may be necessary to decrease spacing gradually to a minimum of 2 or 2¼ ft at tail pulley. Exact spacing at various points depends on the load, belt tension, belt width, and slope of conveyor.

Regarding belt pulleys, the larger the pulley, the less the stretching of the rubber compounds (friction) used to cement plies together in rubber belts and of the stitching holding plies together in fabric belts. Larger diameter pulleys, therefore, contribute to longer belt life. It is general practice in the case of 28-oz duck plies to use a drive pulley having a diameter in inches at least five times the number of plies in the belt. This applies to single drive pulleys. In tandem drives, diameter of the pulleys should be four times the number of plies. Pulley diameters should be increased 10-15 per cent for 32-oz duck, 20-25 per cent for 36-42-oz duck and 25-30 per cent for 48-oz duck.

Pulley diameters given are those that should be used with belts of various weights of duck and number of plies when belts are stretched to full tension. If the belt is not stretched to the full amount, which is the case in many installations, pulley diameters may be reduced proportionately to not less than 75 per cent of recommended diameter. If the belt tension rating is exceeded, pulley diameters should be increased proportionately.

If pulley diameters are smaller than recommended, there is danger of ply separation resulting from excessive flexure of the belt. With slow conveyor speeds and with conveyors having long centers whereby bending over pulleys is infrequent, it is possible to use smaller pulleys because the degree of flexure and consequent fatigue failure are reduced. Pulley faces should be wider than the belt to prevent its running over the edge with consequent damage to edges of the belt.

Three general types of drive pulleys are in common use—bare iron or steel, lagged and magnetic. Lagged pulleys have a rubber (*Please turn to page* 238)



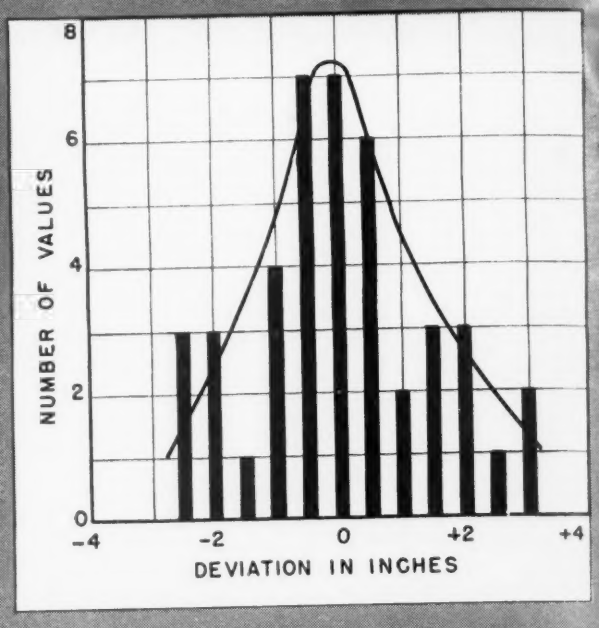


Fig. 1 (above)—Probability curve for 42 heats covering the range of composition and temperature of the fluidity chart shown in Fig. 3

Fig. 2 (left)—Modified fluidity spiral pattern used in obtaining data reported in this paper

What the Fluidity Test Reveals

About Gray Cast Iron

Reporting on tests conducted with a redesigned spiral, the authors show what has been learned about the fluidity of gray iron and tell how the test can serve as a foundry tool. This paper was presented originally before the 1953 Wisconsin Regional Foundry Conference

By LEW F. PORTER and PHILIP C. ROSENTHAL
Instructor of Metallurgy *Professor of Metallurgy*
Department of Mining and Metallurgy
University of Wisconsin
Madison, Wis.

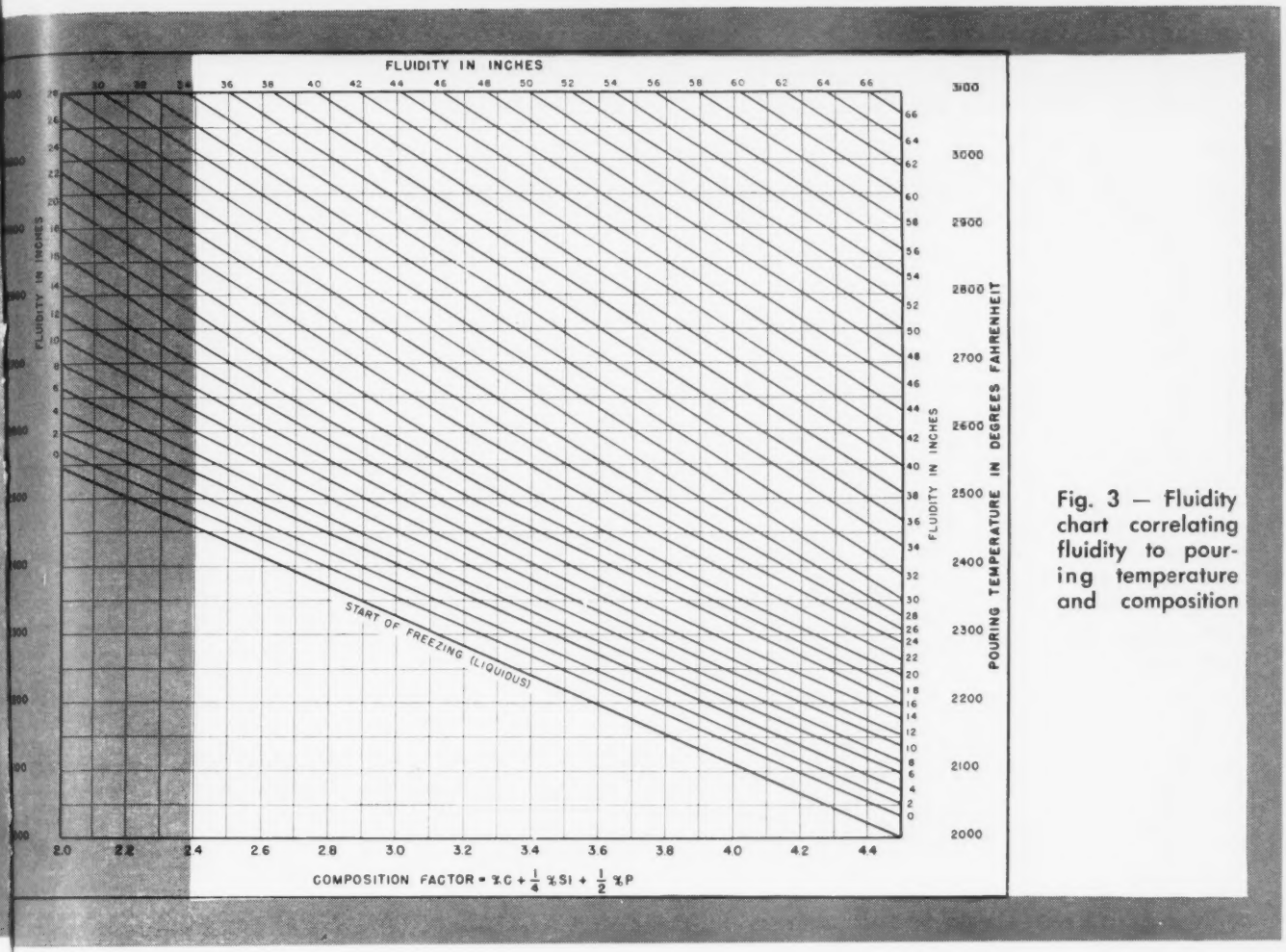

FLUIDITY IN INCHES
FLUIDITY IN INCHES
FLUIDITY IN INCHES
POURING TEMPERATURE IN DEGREES FAHRENHEIT
START OF FREEZING (LIQUIDUS)
COMPOSITION FACTOR = %C + 1/4 %Si + 1/2 %P

Fig. 3 — Fluidity chart correlating fluidity to pouring temperature and composition

PRODUCERS of castings are not directly concerned with the properties of liquid metals. Their main problem is to obtain a solid casting of the desired shape and quality, because it is the solid metal and its properties that control the sale value of the casting. Nevertheless, liquid metal must be used to form the casting initially, and its fluidity and freezing characteristics must be known and controlled to assure adequate feeding of the casting.

The many valuable contributions on the flow of metal in a mold, on gating and risering, and on the solidification process indicate the importance of these problems. In the case of gray cast iron, for instance, it is obvious that obtaining good castings in such thin-section products as stove plate, piston rings, enamelware, and the like depends on having adequate fluidity in the metal.

Even in the production of heavy-section castings, where fluidity tests might not normally be considered, the test can be helpful in providing information about the iron. It is the intent of this paper to show what has been learned about the behavior of gray cast iron from the fluidity test, and how it can serve as a foundry tool.

Before we touch on these applications of the fluidity test, however, we should first give some consideration to the limitations of the test itself. To be useful, a test must yield sufficiently reproducible results. When the study of gray cast iron fluidity[1] was begun, it was found that the ordinary fluidity test spiral gave results that deviated about 10 per cent from the mean for metal of the same composition and pouring temperature. This was considered too wide a variation for the contemplated program; consequently the test spiral was redesigned to cut down the percentage deviation to about 2 per cent. The new design is based on a similar one proposed by Portevin and Bastien.[2]

Metal Enters at Center—One of the changes was to have the metal enter at the center rather than the outside of the flow spiral. This arrangement permitted the use of a well at the base of the sprue and an overflow basin opposite the pouring basin (Fig. 2). An orifice core also was placed in the sprue just above the parting line. The opening in the core was 10 mm. In the original Saeger-Krynitsky design the metal flows from the pouring basin directly through a horn gate into the fluidity spiral. The fluidity spiral length therefore will be partially dependent on the velocity with which the first metal enters the sprue. Since this is difficult to control, there is always some chance for variation from one test to the next.

In the modified fluidity spiral, the first metal enters the well rather than the spiral. It is only after constant flow conditions have been established that metal enters the spiral. Constant flow conditions are established through the use of the overflow basin which maintains a constant head of metal and the use of the orifice core which also aids in controlling the rate of

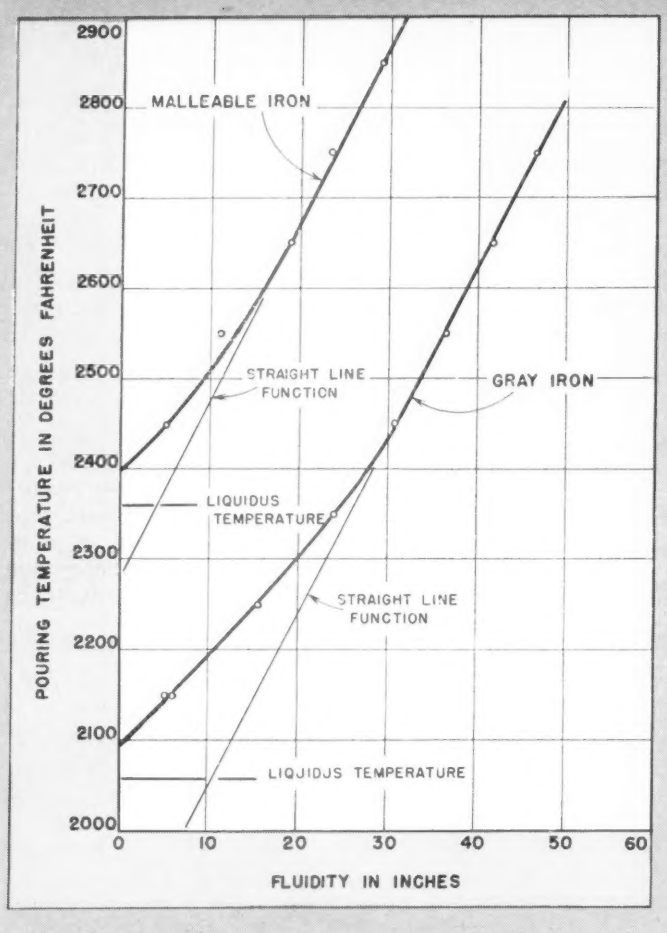


Fig. 4—Effect of pouring temperature on fluidity of gray cast iron and malleable iron compositions

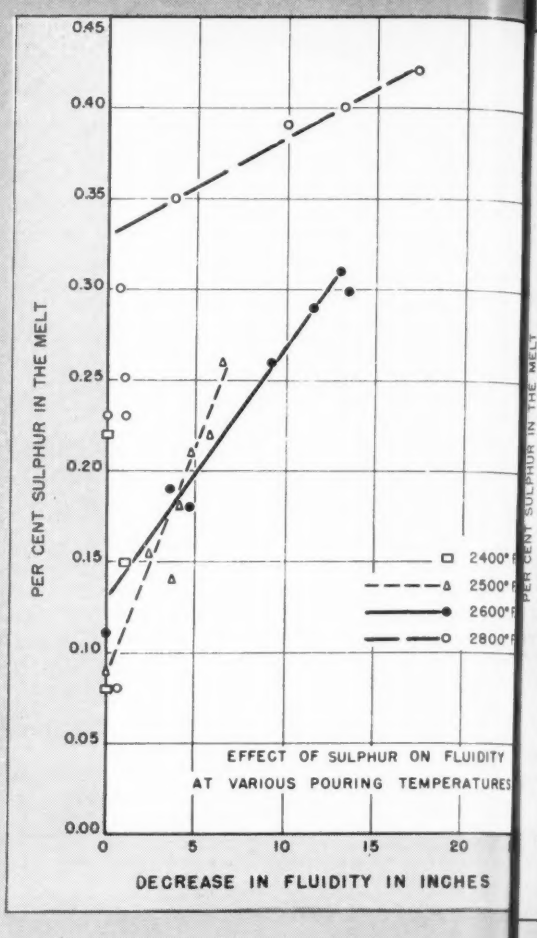
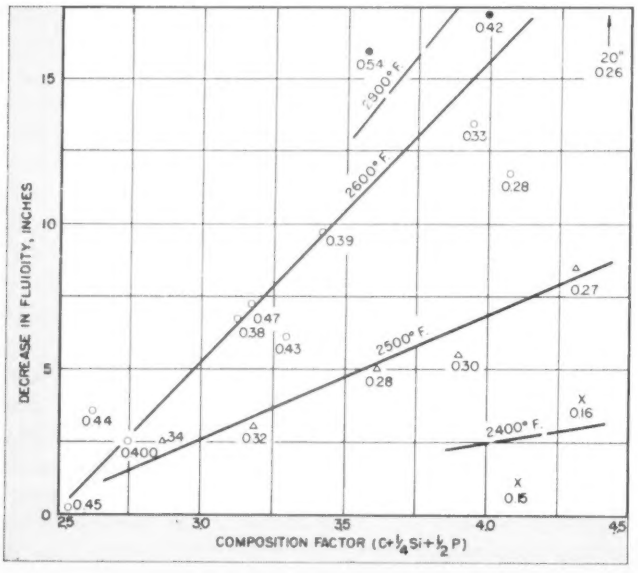


Fig. 5—Sulphur affects fluidity only when enough manganese is present to form high-melting sulphides

Fig. 6—Relationship between the composition factor (C + ¼ Si + ½ P) and decreased fluidity at various pouring temperatures for irons given a sulphur addition of 70 grams of iron sulphide in an 8-lb heat



flow. Good reproducibility is a necessary requirement if fluidity test values are to be used for a control test.

Another item of consideration in the use of the fluidity test is the effect that molding variables such as moisture control, permeability, mold hardness, and others, might have on the fluidity values. Experience has indicated that normal variations in these mold conditions do not have a noticeable effect on fluidity. It should be expected, therefore, that normal day-to-day variations in molding variables in a single foundry or the variations encountered from foundry to foundry should not be expected to alter the fluidity values to any marked extent. This is true for molds made in green sand, but there may be some question whether this would be true if the mold were made by the shell molding process or by some other special process. The effect of such alternative methods for making fluidity molds remains to be explored.

How To Apply It—Having established the requirement that the fluidity test be reasonably reproducible and that normal fluctuations in mold conditions are unimportant, let us see how the fluidity test can be applied as a control in the gray iron foundry.

If no means are available to measure temperature or to determine the composition of the iron, the flu

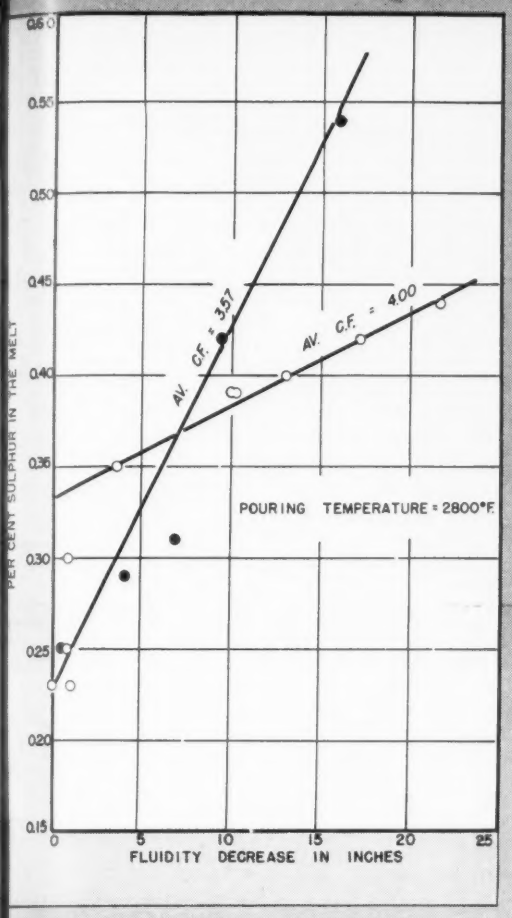


Fig. 7—Effect of sulphur on the fluidity of irons with different base compositions

TABLE I—Effect of Pouring Temperature on Sulphur Recovery*

Heat No.	Pouring Temp., ° F	Base Composition, % C	Si	P	Mn	Sulphur Content
3	2400	3.18	2.38	0.71	0.64	0.22
10	2500	3.08	2.08	0.72	0.67	0.26
17	2600	3.11	2.13	0.66	0.80	0.31
26	2800	3.08	2.26	0.72	0.91	0.42

*All heats were 8 lb with a constant sulphur addition obtained from 70 grams of iron sulphide. Analysis samples taken from the molten metal at pouring temperature.

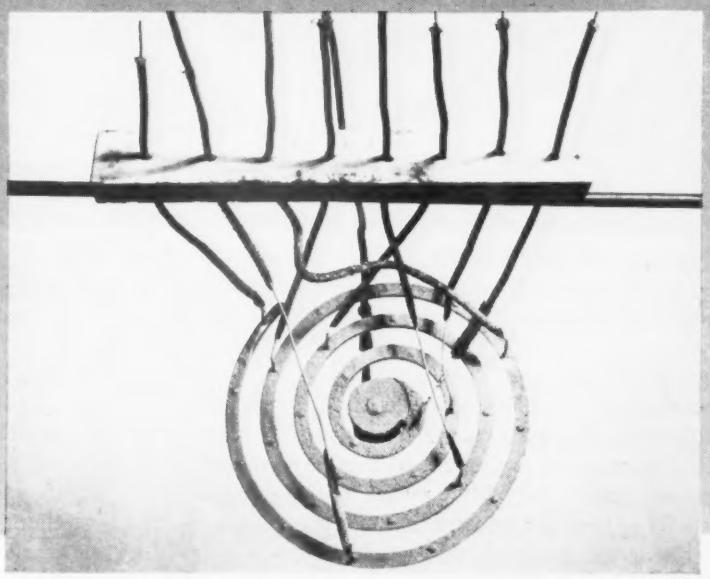


Fig. 8—Wires located every 8 in. along mold spiral energized an electric recorder circuit as flowing metal touched each contact point

idity test presents an excellent check on whether or not a given mold can be filled. Providing some previous checks have been made between the fluidity test and the condition of the casting poured with the same metal, the fluidity test can serve as a "go or no-go" test for pouring. This is particularly worthwhile when pouring an expensive or intricate mold, or when pouring a series of molds that require adequate fluidity in the iron.

The limitation of this procedure is the fact that even though the iron may fill the mold properly, it may not be of the desired composition as far as the properties of the solid casting are concerned. This problem can be handled if a correlation exists between fluidity, pouring temperature, and composition. Thus, if we know the pouring temperature, we can determine the composition from the length of the fluidity spiral.

A correlation of this type is shown in Fig. 3. This chart was prepared from data furnished by a series of heats of controlled composition, and poured at several temperatures. The fluidity values indicated on the chart were obtained with the modified fluidity spiral. The reliability of the chart is indicated by the probability curve for 42 heats shown in Fig. 1 covering the entire range of composition and temperature of the fluidity chart. It is seen that the deviation between fluidity values obtained from the chart and actual values is small. Details regarding the chart and its construction can be found elsewhere.[1]

The base line of the chart represents the combined effect of carbon, silicon and phosphorus in proportion to their effect on the fluidity. This is referred to as the "composition factor" and is equal to the carbon percentage plus one-fourth the silicon content plus one-half the phosphorus content (C + $\frac{1}{4}$ Si + $\frac{1}{2}$ P). Temperature is plotted on the side and the sloping lines represent lines of constant fluidity.

If the pouring temperature and fluidity of a given iron are known, the intersection of the fluidity line and temperature line will fix a point which establishes the composition factor. Although this does not fix the composition exactly, it does give information regarding the properties of the solid metal. The composition factor has a form which is similar to the "carbon equivalent" (C + $\frac{1}{3}$ Si + $\frac{1}{3}$ P) that has been used to relate properties to composition. Thus, the higher the composition factor or the "carbon equivalent," the lower the strength and hardness of the iron.

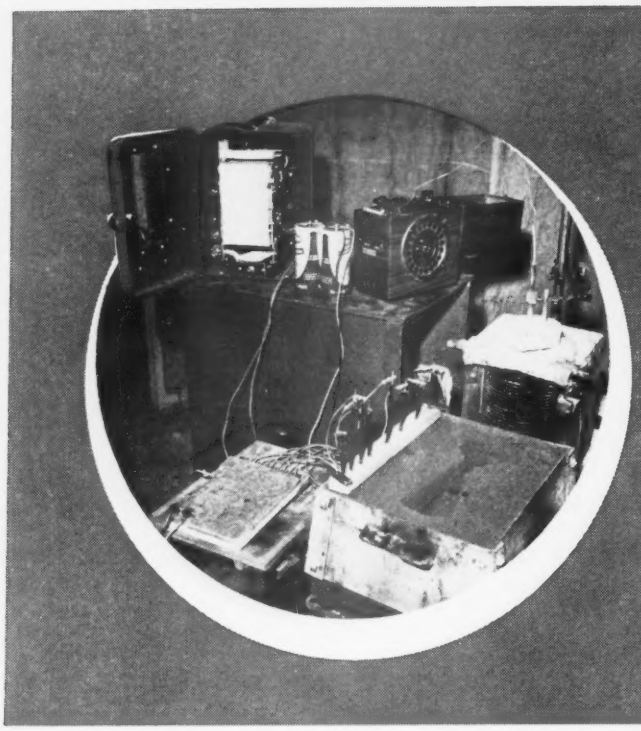


Fig. 9—Apparatus assembly used for recording flow rate information forming the basis of this article

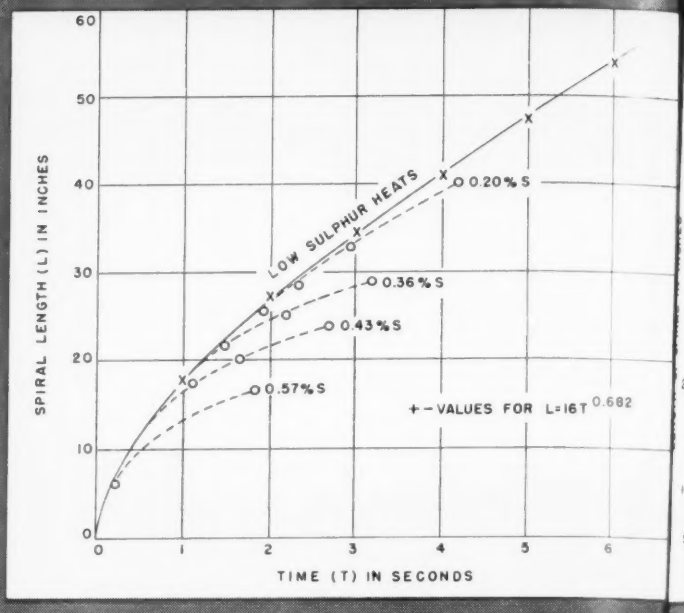


Fig. 10—Metal flow rate as altered by differences in composition and pouring temperature of the heats

The composition factor and "carbon equivalent" are not the same, however, since the former is essentially a factor expressing the effect of the three elements on the properties of the liquid metal, and the latter represents the best approximation of the effect of the three elements on the eutectic point.

The chart also can be useful in another way. Suppose, for instance, that instead of knowing the temperature of the iron, the composition is known. This will permit calculation of the composition factor, and the intersection of the line representing it with the fluidity line as determined by a fluidity test will give a reasonable determination of the pouring temperature of the metal going into the fluidity spiral.

As an example, suppose the iron analyzed 3.30 C, 1.72 Si, 0.25 P, 0.55 Mn and 0.10 S. The composition factor for this iron would be 3.30 + ¼ (1.72) + ½ (0.25) = 3.30 + 0.43 + 0.12 = 3.85. If the fluidity spiral length happened to be 30, the chart will show that the pouring temperature was about 2560° F. Therefore, the fluidity value plus a knowledge of the iron composition can be used as an indirect measure of the temperature.

If it were desired to change to another composition, the chart can be used to indicate what the new pouring temperature would have to be in order to maintain the same fluidity. An increase in any of the three elements requires a decrease in pouring temperature whereas, a change in the other direction requires an increase in pouring temperature to maintain constant fluidity.

Iron Behavior Disclosed—While the primary reason for the fluidity chart is to make the fluidity test a more useful tool in the foundry, the relationship it reveals between composition, pouring temperature, fluidity and other factors investigated in conjunction with the determination of this relationship, has disclosed much about the behavior of molten gray cast iron. For example, the chart reveals that the fluidity of any iron is very closely related to the freezing process, since the lines representing constant fluidity are almost parallel to that representing the beginning of freezing.

It is also noticeable on the chart that as the pouring temperature approaches the line representing the start of freezing (solidus), the fluidity decreases rapidly.

TABLE II—Heats Made with Abnormally High Carbon, Silicon, or Phosphorus Contents to Determine the Fluidity Values, and the Effects of Sulphur on this Fluidity

Heat No.	Composition, % C	Si	P	Mn	S	Comp. Factor	Fluidity, Inches Actual	Calc.*	Diff.
249	**3.49**	1.90	0.14	0.34	0.09	4.48	60+	52	+ 8
244	**3.77**	1.01	0.13	0.87	0.43	4.08	27	46	—19
248	1.91	**8.22**	0.13	0.34	0.05	4.02	47	45	+ 2
245	1.86	**6.77**	0.14	1.02	0.15	3.62	39½	39	+ ½
247	1.87	0.91	**3.35**	0.49	0.08	3.77	40¾	41	—¼
246	1.93	0.90	**3.30**	0.98	0.51	3.80	21¼	41½	—20¼

*Obtained from Chart, Fig. 3.

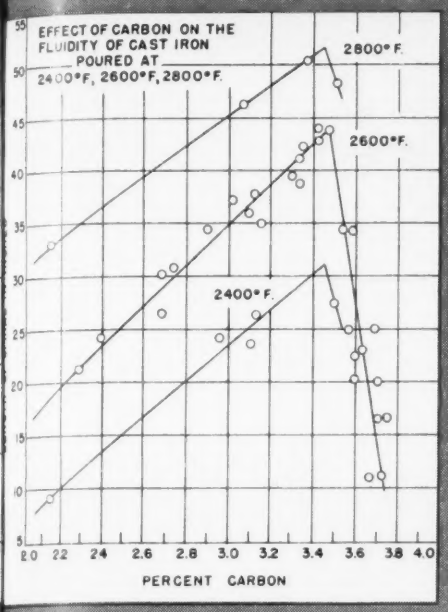


Fig. 11—Carbon effect on fluidity of base iron with 2.2 Si and 0.7 P

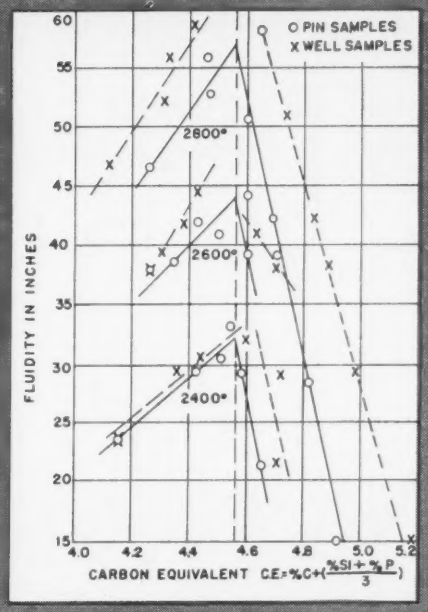


Fig. 12—More data on carbon effect when poured at 2400, 2600 & 2800°F

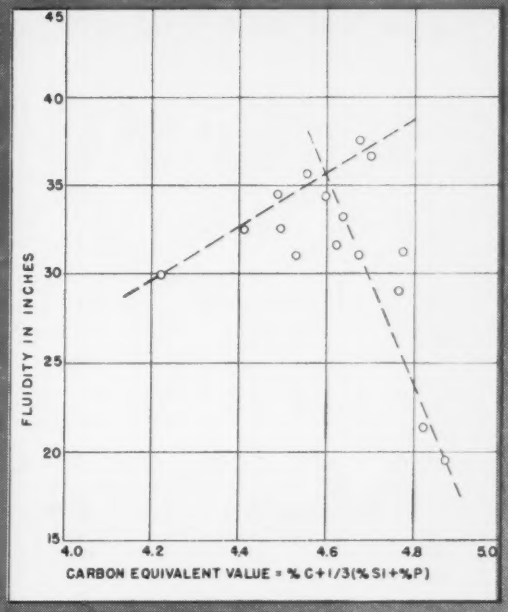


Fig. 13—Results with near-eutectic irons poured in small section molds

This effect, which becomes apparent when the pouring temperature is less than about 350° F above the freezing temperature, is illustrated in Fig. 4. The fluidity of both a malleable iron composition and a gray iron composition falls off rapidly when the pouring temperature nears the beginning of freezing as represented by the respective liquidus points shown on the graph.

It will be noted that the manganese and sulphur contents were not considered in the preparation of the chart. It has been found that normal fluctuations in manganese have only a minor effect on fluidity. Sulphur was kept at about 0.10 per cent for those heats that were used to prepare the chart. Considerable additional study was made of the effects of sulphur[3], because conflicting evidence regarding its effect on fluidity was found in the literature. Some investigators attributed poor fluidity to sulphur, others found no effect, and still others found that it did not affect fluidity except when it was present in excessive amounts. The study that was made on sulphur showed that it exerted a pronounced but complex influence on fluidity in that its effect was dependent not only on sulphur content, but also on the pouring temperature and the composition of the iron.

The curves shown in Fig. 5 illustrate how sulphur affects fluidity of a base composition having a composition factor of about 4.0 (3.15 C, 2.30 Si, and 0.70 P). According to the chart in Fig. 3, this base iron is fairly close to eutectic composition. The fluidity values for the sulphur-bearing irons were compared with those for a similar iron of normal sulphur (0.10 per cent) obtained directly from the fluidity chart. The differences in fluidity values then were plotted against the sulphur control for the various pouring temperatures.

It is seen that at a pouring temperature of 2800° F, sulphur drastically reduces fluidity, although only when plenty of sulphur is present (above 0.33 per cent). At a pouring temperature of 2600° F, the effect of sulphur is not quite so bad, but its reduction of fluidity extends down to a sulphur content of 0.13 per cent. At a pouring temperature of 2500° F, the threshold value for sulphur dropped to 0.09 per cent, but its effect above this value was not as great as at the higher pouring temperatures. When the iron was poured at 2400° F, no effect from sulphur was noted.

Thus, it can be concluded that irons having close to a eutectic composition, and having sulphur contents above about 0.10 per cent, would be expected to have a reduced fluidity as compared with the normally expected fluidity if they are poured in the range of about 2500 to 2600° F. These effects of sulphur were found to occur only when (*Please turn to page* 245)

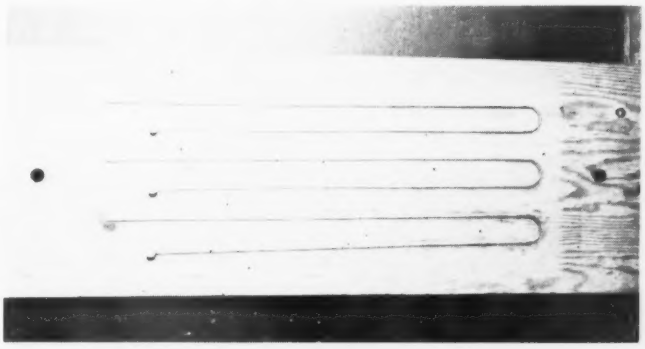


Fig. 14—The test pattern used to evaluate effect of a small cross section (5/32-in.) on the fluidity of hypereutectic and hypoeutectic gray irons

Outstanding Opportunities for the Foundry Industry

Important developments in the foundry industry during recent years make this discussion of the outstanding opportunities available to producers of castings most timely. The paper comprised the Charles Edgar Hoyt Annual Lecture presented by the author at the national convention of the American Foundrymen's Society in Chicago, May 7

By JAMES H. SMITH
General Manager
Central Foundry Div., General Motors Corp.
Saginaw, Mich.

MY ASSOCIATION with the foundry industry dates back to 1921, and during all of that time I have been either in the manufacturing or management end of the business. Since I am not a specialist, I am not qualified to speak from a technical standpoint; but rather, my observations concerning the foundry industry must be, quite obviously, from the viewpoint of a businessman.

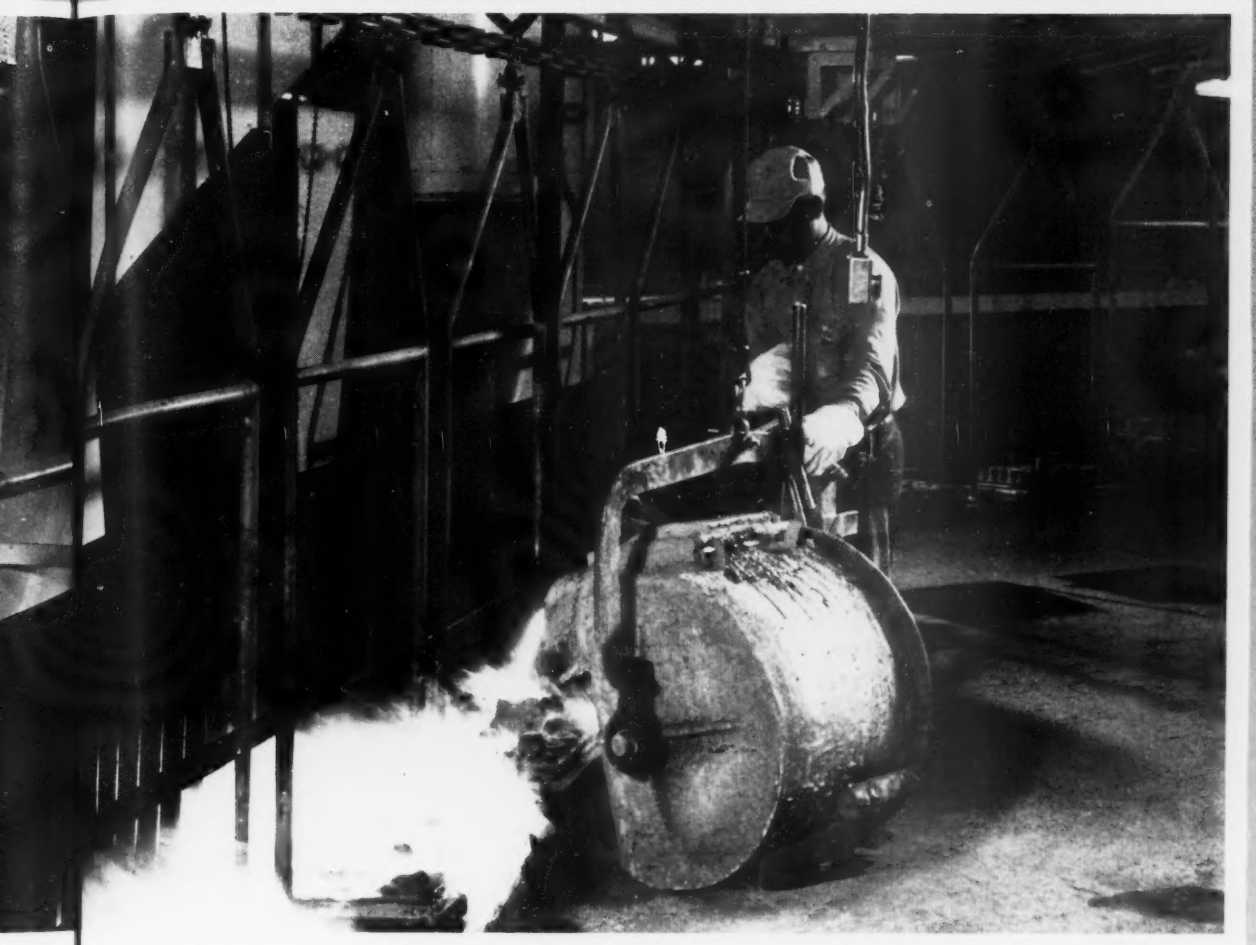
I am rather fortunate to have recently had the opportunity to visit many foundries, both in this country and in several countries in Europe; and, because of my discussions with a great many foundry executives, I believe I have a pretty good idea of the trends in the foundry industry, I am certain there are more new and interesting developments available to the industry, which can affect it economically, than at any time since I have been connected with it; and, as a matter of fact, some of the things we are working on could revolutionize the industry. Consequently, I selected as my subject "Outstanding Opportunities for the Foundry Industry."

The subject is a very broad one, and there are a great many opportunities which I would like to discuss, but the lack of time prevents it. However, there are five particularly important opportunities which I thought might be of the most interest:

1. Molding methods and materials.
2. Metallurgy of cast iron.
3. Heat treatment of cast iron.
4. Methods engineering.
5. Educational programs for the foundry industry.

As all of my foundry experience has been in the ferrous-foundry field, many of my remarks will concern that type of business; however, *most* of what I will discuss pertains to all branches of the foundry industry.

Molding Methods and Materials—The foundryman has improved sand workability to achieve better molds, truer, cleaner and more economical castings. He has obtained these results by better understanding of the materials used in the



Pouring shell molds on a continuous conveyor. After being poured, the shells are left on the conveyor for a short time to allow them to cool

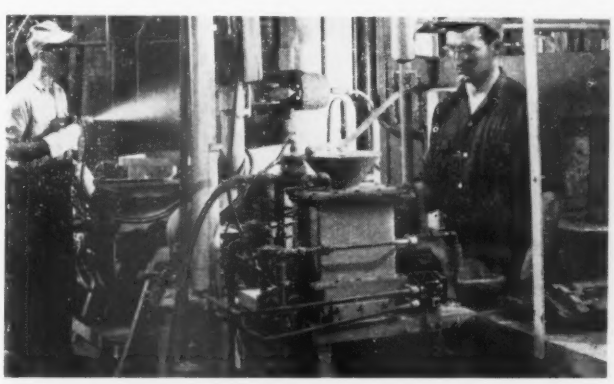
preparation of the sand and improved equipment for distribution and mulling of the clays.

New, sand-conditioning resins for the foundry industry are now available, and the next few years should see some very important developments which will improve conventional, green-sand molding methods.

A new molding technique has been developed called pressure molding, which utilizes pressures up to 500 psi of squeeze as compared with pressures of 50 psi or less being used at the present time. This method produces a very smooth and accurate casting. Proponents of this molding method are very enthusiastic regarding the future of the process. I would not be surprised if, within a few months, some plants were in production, using these high-pressure molding machines with resin additives to the molding sand.

The function of these resin additives is to improve the workability of the sand through uniform clay distribution, eliminating any clay balls. The result is increased flowability of the sand with uniform hardness molds on both vertical and horizontal mold surfaces, producing castings needing a minimum of cleaning. The trend in molding sand technique is definitely in the direction of reduced cleaning time and closer dimensional tolerances.

The shell molding and coremaking process needs



Internal shell-making machine with the baking oven conveniently located directly behind the operator

Two automatic shell-making machines are run by one man shown removing shell from machine at the right

no introduction. I consider the shell process one of the greatest technical developments of our time in the foundry industry. In my estimation, it may revolutionize foundry molding techniques to the point where it will be more economical to produce most small castings, and some large castings, by the shell mold process than with conventional, green sand molding.

Complete mechanization of the molding operation on high-production runs is possible using this process. Several machines which accomplish this are already on the market.

Shell Process Permits Close Tolerances

The shell process is usually considered a precision casting process. It is usually thought of as being between green sand molding and the lost wax technique. At Central Foundry Division we are approaching the shell program from the standpoint of producing a better casting for less money and, at the same time, holding the dimensional tolerances to closer limits than with our present green sand method. We are not promising tolerances to the degree where machining can be entirely eliminated. Some of the claims which have been made in published articles regarding tolerances have been very misleading.

We know that it is possible to hold very close limits on castings made in experimental laboratories using laboratory methods, but we know also that the same results are very difficult to obtain in high-volume production, using practical manufacturing methods. There is every reason to believe that sometime in the future, as the technique is further developed, it will be possible to cast many surfaces to much closer dimensional tolerances.

The cost of the phenolic resins used to provide the bond material for the silica grains in the construction of the shell is the main reason for the process not being more widely used. There seems to be little chance of a reduction of the present high cost of phenolic resin because of the stable price of phenol. Manufacturers are striving to discover suitable resin substitutes and extenders.

Our research laboratory has a continuous program to try to find a substitute for phenolic resin or a material which can be blended with phenolic resin to produce a less expensive mix. If it is possible to use a material which would bring the price of the bonding material down to 10 or 15 cents a pound, I believe most everyone would use the shell process for the production of small castings. Even at the present high resin cost, many castings can be produced at a cost comparable to green sand molding. This is particularly true where cores can be eliminated by the use of the process.

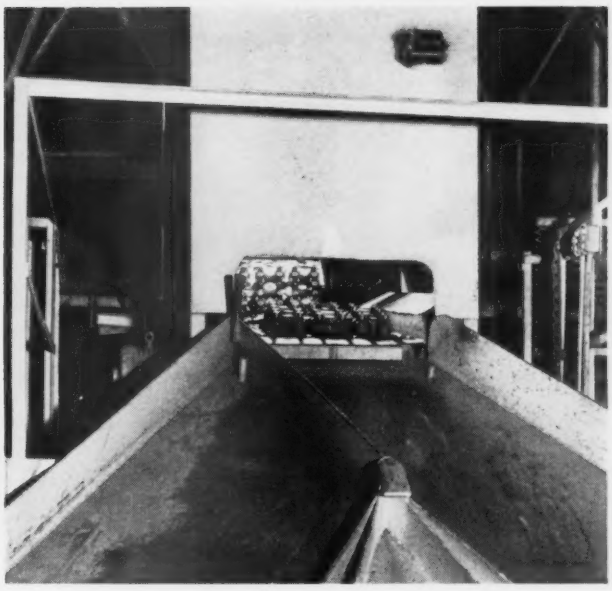
(At this point, a motion picture of the shell process which had been made for this presentation was shown. Illustrations presented here are a few scenes from the motion picture. Ed.)

At our Saginaw Malleable Iron Plant, where quite a few castings are made in shell molds, we use a continuous pendulum-type conveyor with shell-making machines parallel to the conveyor.

The shell-making machine is an integrated mechanism operating in cycles and consisting of a gas-fired, radiant-burner oven, a rollover box containing the sand-resin material, and the pattern mounted on a hinged arm. Adjacent to this machine is a vibrator-actuated container which holds dry resin used for gluing the shells together, a fixture for knocking out the top of the pouring sprue and a jolt-squeeze machine which is used in the gluing operation to press the halves of the shell together.

At the start of the cycle, the hot patterns, both cope and drag, are lowered onto a rollover box which contains a sand-resin material from which

Shells are glued together by sprinkling them with dry resin and pressing them together in a machine



Cam-actuated mechanism tips conveyor plates, dumping shells and castings off to the shakeout screen

the shells are made. The rollover box and pattern are then inverted for about 20 seconds, which is the approximate time needed for enough of the material to adhere to the hot pattern to make a shell about 5/16-in. thick.

When the shell is ready for curing, the rollover box returns to its original position. The shell and pattern mechanically enter the gas-fired, radiant-burner oven for curing. The amount of curing time will vary with the thickness of the shell—for example, a shell 5/16-in. thick requires approximately 40 seconds.

After the shell is cured, the door of the oven rises and the mechanical arm carrying the pattern and shell moves to a vertical position parallel to the furnace door. Spring-loaded ejector pins release the shells from the pattern. The operator places the drag half on the gluing fixture, and the cope half is placed on the holder which knocks out the top of the pouring sprue. He positions the resin container which vibrates dry resin onto the shell and then places the cope half onto the drag half and touches the control which automatically moves the squeezehead of the gluing machine into position. The machine presses the halves together for a predetermined length of time sufficient to assure a firmly-bonded complete shell.

The completed shell is placed on the pendulum conveyor and moves to the pouring station. After being poured, the shells remain on the continuous conveyor for a short cooling period. When they arrive at the shakeout screen, a cam-actuated mechanism tips the conveyor plates, and the shell and castings are dumped onto the shakeout screen. The sand is vibrated through the screen, and the castings drop into a hopper below.

We are sure there will be further, rapid development in this interesting technique of making castings.

I have covered but two of the new molding techniques, and I understand considerable work is being done on other methods. Certainly this development work in molding methods will result in tremendous opportunities for our industry.

Metallurgy of Cast Iron—Most of the technical advancement in the ferrous industry during the past century, with the exception of recent years, has been in steel; very little progress was made in the development of cast iron. Recently, engineers and metallurgists working together have made wonderful strides in cast iron metallurgy, in developing new alloys and in improving melting techniques.

One of the developments of this period of re-

Using a double corebox setup on this machine increased production 42 per cent. Formerly the machine was idle when the one box was being drawn

Left—Formerly valve rocker arms were ground by using a pressure bar to push them against a grinding wheel. Right—Now castings are set on a turntable which carries them under a grinding wheel. The ground castings are ejected by air to a conveyor

search is nodular iron. This product, as is well known, is frequently made by adding magnesium or magnesium alloys to gray iron which changes the graphite form from flake on solidification to some other pattern, preferably to a round shape similar to that of temper carbon in malleable iron.

A realistic evaluation of the market for this type of iron indicates that it has a wide range of potential engineering applications. The product will have a much larger market if and when it is possible to produce it more economically and with more uniform results. To accomplish this, it is possible that it may be necessary to find a method of making this or similar products in the cupola or some other melting medium. Continuing research is being conducted in this country and abroad, and there is every reason to believe that in the future nodular iron will assume a much more competitive role.

Another development which will definitely have a marked effect on the iron casting industry, is the production of a low-sulphur gray iron. To produce it, molten cupola iron is treated with finely divided particles of calcium carbide. This product possesses superior physical properties with a tensile value approaching 50,000 psi and with a brinell hardness of around 200.

If it is of the proper analysis, the calcium carbide-treated metal, with the addition of magnesium oxides, can be used to produce nodular iron; and I understand other nodularizing agents, such as rare earth oxides, have also been used successfully with this base metal in producing nodular iron.

Comparatively little of this low-sulphur iron has been produced on a production basis; but, no doubt, there will be an increasing demand in the future providing the product can be produced economically.

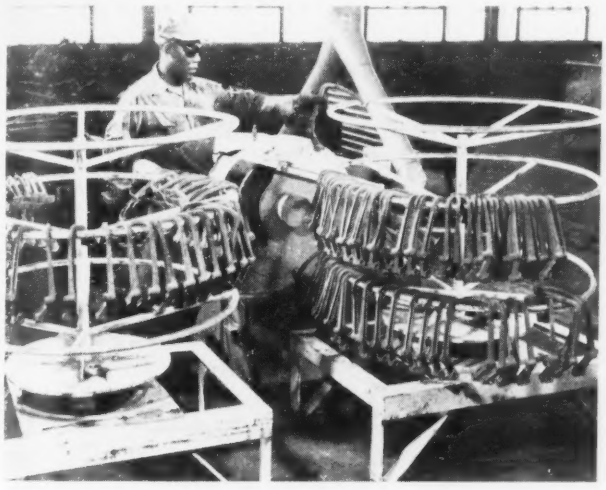
Another cast iron which has been developed in recent years is pearlitic malleable iron. (Our trade-name for this product is ArmaSteel.) In our plants we make this iron by using the regular base white iron which is melted in a cupola and superheated in an electric furnace. The castings are then malleablized in a continuous, radiant-tube, gas-fired, heat-treating furnace; quenched in air at about 1650° F; and tempered back to the desired hardness.

During the last 15 years the use of this product has increased from practically nothing to about 100,000 tons per year. The product has found wide application in the automotive field and particularly in automatic transmissions. It is also used effectively for household appliance parts, diesel engine parts, hand tools and many other uses. The contribution of this engineering material to the small arms, military truck and ammunition programs during World War II and in the Korean conflict has been substantial. The future of this product looks very promising; it is constantly replacing forged steel parts, weldments and stampings.

Another development of the last few years is a product called Bisbo Iron, which was developed in General Motors' research laboratory. This iron is made by adding small amounts of bismuth and boron to white iron base metal and malleablizing to make a pearlitic structure. The purpose of the alloy additions is to prevent formation of graphite on solidification in heavy section castings. Previously, malleable iron castings have been cast

in relatively light sections, generally less than 1½ in. Castings are now being produced in sections up to 4 in. and free from primary graphite. Since this type of iron can be produced from a standard white iron base metal, it has many possibilities; therefore I can visualize a considerable tonnage of castings with heavy sections being made from this material.

The trend of the designing engineers in the automotive and allied fields is toward more intricate castings with thinner walls. How is the foundryman going to meet this challenge? I believe the most logical way is to be able to pour iron into the mold at a uniformly higher temperature than is being done at present. This can be accomplished by a duplex melting operation, melting down in the cupola and superheating to a constant temperature in an electric furnace. We are about to start this practice in the gray iron foundry



Annealed foot pedals are put on portable, rotating racks from which operators take them for grinding, milling or straightening, disposing to another rack

where we are making automotive and diesel engine cylinder blocks and heads. We believe that the improvement in metal and temperature control will more than justify the added cost and make it possible for us to meet the ever-growing demand for lighter section castings.

An outstanding development in melting practice in recent years has been the increased use of basic-lined cupolas. To produce some of the new irons we have been discussing, it appears that basic-lined cupolas will be more widely used as the new irons come into greater demand.

The metallurgical developments of the past few years in the foundry industry have been little short of miraculous. It is difficult to visualize the tremendous effect that minute percentages of certain elements have on the molecular structure and physical properties of iron. The use of microchemistry in the foundry industry is in its infancy. The control and effects of small amounts of various elements will play an important role in foundry metallurgy, possibly to even a greater extent than has been witnessed during the past few decades in the steel industry.

The new products which have been the results of these development programs have had a tremendous effect on the economy of the country. They have made it possible for the manufacturers of many items, such as automobiles, household appliances, farm equipment, diesel engines and many others, to make a better product at a lower cost. I am sure that with all of the new things on which we are working and with developments of the future we will have the opportunity and will continue to make a substantial contribution to the over-all economy of our country.

Heat Treatment of Cast Iron—Much research work has been conducted in recent years on the heat treatment of various types of iron. Maximum uniformity of structure is always important and is one of the benefits derived from heat treatment. There are various heat treatments for cast iron which, I believe, will be used increasingly in the next few years—for example:

Annealing for Stress Relief—This type of heat treatment definitely increases the life of large and highly stressed gray iron parts. It is used to a great extent for diesel engine cylinder blocks and heads and similar parts. The temperature used must be kept below the "critical," with the temperature and time depending upon the size and form of the castings.

Annealing for Machinability—I believe that this type of heat treatment for many gray iron castings will increase *very* rapidly in the next few years. In one of our gray iron foundries, over 80 per cent of the production is annealed for machinability, with a resultant increase in the machine shop of 25 to 50 per cent in the output per machine and an increase in tool life of over 100 per cent. This method of annealing is called micro-structural control to produce a ferritic matrix. How can any cost-minded management miss this opportunity of cost saving wherever machinability is of prime consideration! For most gray iron castings, an hour at 1350 to 1550°F, depending upon the chemistry of the castings, will produce the desired results.

Quenching for Higher Strength—This type of heat treatment will gain much wider use as time goes on, due to the fact that there is an increasing demand for higher strength irons. By heating to approximately 1600°F and quenching in oil, followed by a subsequent draw, 60,000 to 80,000 pound tensile irons can be produced. The heating temperature may vary in relation to the chemistry of the iron.

Martempering—This is a relatively new method of heat treatment for castings. Castings are quenched rapidly from above the "critical" by submerging in a liquid bath and holding at a temperature of about 400 to 500°F. Castings are held in the bath only until they have reached

the same temperature as the quenching medium and are then withdrawn and cooled in air. In some instances, a subsequent low-temperature draw is used to further reduce any tendency toward cracking, particularly if the casting shape is intricate. This treatment has been used on a number of finish-machined, pearlitic malleable iron castings with the advantage of minimizing internal strains and preventing warpage. This method will find an increasing number of applications in the future.

Heat treatment is somewhat new for many foundrymen. When they realize the advantages to be gained in increased physical properties and the marked improvement in machining characteristics, I am certain there will be a very decided increase in the heat treatment of iron castings.

Certainly there are enough possibilities in this phase of our business to consider it an outstanding opportunity for the future.

Methods Engineering—This comprises the analyzing and planning of employee movements to increase their effectiveness. This means the elimination of idle time, the reduction of ineffective movements, such as long body bends, turns, walking, heavy lifting and others. An analysis is also made to determine the advisability of combining operations.

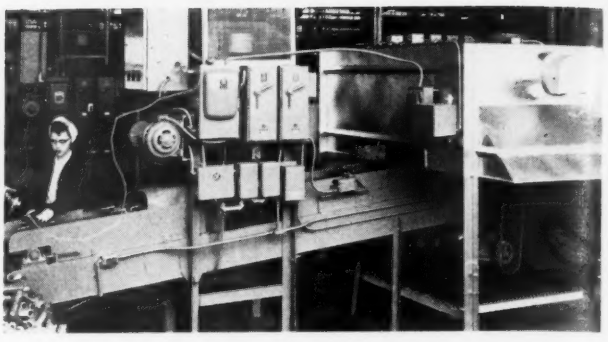
This analyzing and planning not only improves quality and reduces cost; it improves working conditions, relieves monotony and fatigue and results in a much more satisfied and efficient employee. With this accomplished, we are a much better competitor in a highly competitive market which requires a constant effort to provide the customer with a better quality product at lower cost.

I am sure you will agree that a methods program to be effective and successful requires the full support and co-operation of the entire management group. This is a continuing activity as today's improvements may be obsolete tomorrow because new ideas and technological improvements progressively change our thinking.

(At this point, a short film entitled "Methods Engineering as Applied to the Foundry Industry" was shown. A few scenes from the motion picture are shown here. Ed.)

I would like to emphasize that methods engineering is valuable in *any* industry regardless of size or kind and provides an excellent way to realize enormous returns from the time and effort spent. In my opinion, we have only scratched the surface of the unlimited opportunities in methods engineering in the foundry industry.

Educational Programs for the Foundry Industry—We all know that men and materials are important, and up to this point we have discussed the material and process aspects of foundry opportunities. I believe you will agree that machinery and raw material, being on the open market, are available to anyone with the purchasing power to acquire them. What then, makes some organizations more successful than others? It is their greatest asset—people. People of many types and talents make up our entire organization.



A conveyor carries castings through automatic magnetizing, spraying and draining stations in preparation for inspection under an ultra-violet light

Psychologists have divided people into several groups: First, there are those who are irresponsible, about whom little can be done. Next, we find the mildly subnormal who may be satisfactory in some limited fields of endeavor. By far the largest group is what may be called the average individual, a steady worker with no pronounced desire to assume management responsibility. Then there are the above average and those with outstanding ability. In any endeavor, someone has to organize the mildly subnormal and average individuals into a constructive working group. This is the task facing the above-average or outstanding group who have had or made the opportunity to develop their abilities either in technical or leadership fields.

Encourage Potential Leaders

In the administrative and non-engineering phases of our industry, leadership ability is important. There are many opportunities for graduates in other than engineering fields to fill responsible positions in this area. We should encourage business administration graduates and others to enter this industry.

During the last few decades, the foundry industry has actively solicited men in the engineering fields in increasing numbers and has used them to good advantage in all phases of the business. As foundrymen, we look toward the engineer for technical and industrial progress.

As I mention engineers, the thought no doubt comes to mind that I am advocating running all of our plants with engineers or trained technical men. I have no such thought and certainly want that point made clear! The people we have in the industry today are doing and will continue to do a good job. Our objective, however, should not be to do as good as we have—but to improve our position. This means that we must concentrate on training our organization for the present and the future.

The graduating engineer is rarely in a position

to make an immediate contribution to the industry or assume the responsibilities of management. He does, in most cases, have a potential greater than had he not had the benefit of this formal education. The trend in the foundry industry is toward the employment of the technical graduate for future positions of responsibility in manufacturing.

In order to interest engineering students in the foundry industry, we should do three things: (1) Develop methods to influence students who will one day be specifying and using cast metal products; (2) Endeavor to influence engineering students to enter the foundry sequence in schools where such a program is available; and (3) Concentrate on making the foundry sequence available in more schools and universities.

Although the engineering enrollments are seriously low, more engineering graduates have entered the foundry industry in the past year than in previous years; however, we still are not getting our share of the graduating engineering talent. Of last year's class, less than 1 per cent chose for their career the fifth largest durable goods industry in the country. There can be only one answer—they do not realize the opportunity the foundry industry has to offer! And, until the last two or three years, we have done little to let them know of these opportunities.

The Foundry Educational Foundation is aggressively tackling this problem. Since the Foundation was incorporated in February, 1947, a total of 990 graduates entered the foundry industry through the FEF program, and approximately 1450 students were employed as summer workers. This organization is doing, and I believe will continue to do, an excellent job in furnishing the foundry industry with young men schooled in the fundamentals of foundry engineering. However, they can supply the industry with only a limited number of these people. We must recruit all available talent possible from the graduating classes of the engineering schools to get the additional technical people we will need.

Functional placement of shear and shot blast machine in relation to conveyor aids cleaning of differential carriers and requires two less operators

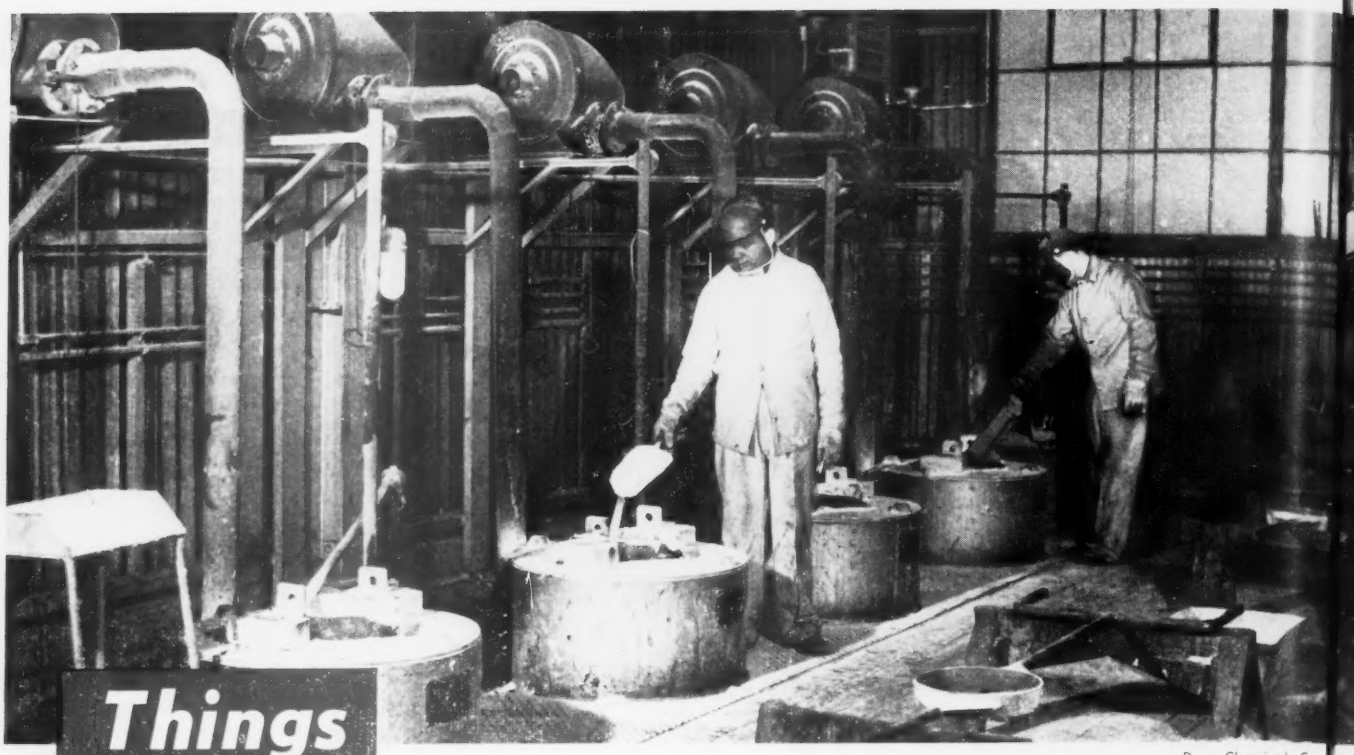
Here are six suggestions which I think will help us attain higher caliber and better-trained organizations:

1. Set up better procedures to select qualified personnel for supervisory positions. This would include selections from within our own organizations as well as new hires.
2. Provide good, workable training programs for all supervisors and technical personnel.
3. Maintain effective apprentice programs to develop the skilled trades necessary, such as patternmakers, tool and die makers, millwrights, electricians, etc.
4. Acquaint more students in the engineering schools with the opportunities in the foundry industry by getting the schools to include foundry educational programs as a part of their curriculum.
5. Try to attract more graduate engineers into the industry to accelerate the development work necessary to keep abreast of competing industries.
6. Support the Foundry Educational Foundation financially.

Certainly it would not be necessary to replace any management employees in the industry to accomplish what I propose. Every year there are in excess of 2000 supervisors, engineers or others in the management group who leave the industry through retirement, death and for other reasons. Concentrating on better training and placement would certainly tend to improve our organizations tremendously.

I believe that there are unlimited opportunities for improved educational programs for the foundry industry, and I would like to emphasize that unless we develop more and better trained people, we will not receive the maximum benefits from the other opportunities we have been discussing.

As I finish this presentation of what I think are "Outstanding Opportunities for the Foundry Industry," I look forward with a great deal of optimism to the future. In our hands lie outstanding opportunities for the foundry industry. This great industry of ours in future years will have engineering markets and stature in the economy of America in direct proportion to what we men in the industry today do in the years immediately ahead of us. We have been told that the future of the foundry industry is bright, but it can only be so as a reflection of our own endeavor. This responsibility is entirely ours, both individually and collectively: If we meet these responsibilities and take advantage of our opportunities, we cannot help being successful in this very interesting and dramatic business.



Dow Chemical Co.

Fig. 1—Lift-out melting furnaces feature removable crucibles from which molds may be poured off directly. They offer very useful flexibility when a variety of alloys must be handled in daily operation

Things To Watch in . . .

NONFERROUS FOUNDR

There is no single right way to cast nonferrous metals, but foundrymen can avoid much trouble by observing certain fundamentals. The author details practices which have an important influence on casting quality

IT IS important for the nonferrous foundry to charge metal—either primary, secondary or clean scrap—of known composition. Borings, turnings, or scrap of unknown composition should be melted, refined, poured into ingots and analyzed before being used as melting stock for pouring castings. Aluminum should be stored indoors to avoid formation of oxide which will absorb water.

Ingot or scrap should not be packed too tightly in the furnace because expansion of the charge during heating may crack crucibles. Light metals are charged into warm or hot pots. Furnaces should be heated bright red before charging copper-base alloys. This reduces melt time. Metals will absorb gases even in the solid state, so avoid preheating of metal in danger zone, and do not allow metal to extend into furnace flame.

Melt heavy material first, then add lighter material to molten pool. This reduces oxidation loss. In the electric arc furnace the charge must not interfere with proper arcing. With the lift coil induction furnace the crucible (low conductivity type) does not get as hot as the metal and tends to chill metal, so slightly higher metal temperature is required.

Hydrogen Porosity—Before discussing melting it may be advisable to see why certain precautions must be taken. Hydrogen appears to be the principal cause of porosity in nonferrous alloys. This porosity appears either as pinhole porosity or microporosity. These two types are due to different mechanisms. Pinhole porosity results from gas evolution during solidification due to the fact that hydrogen is less soluble in solid than in molten metal. When the metal solidifies the gas is forced out of the metal and forms voids in the metal. Table I shows why this happens.[1, 2]

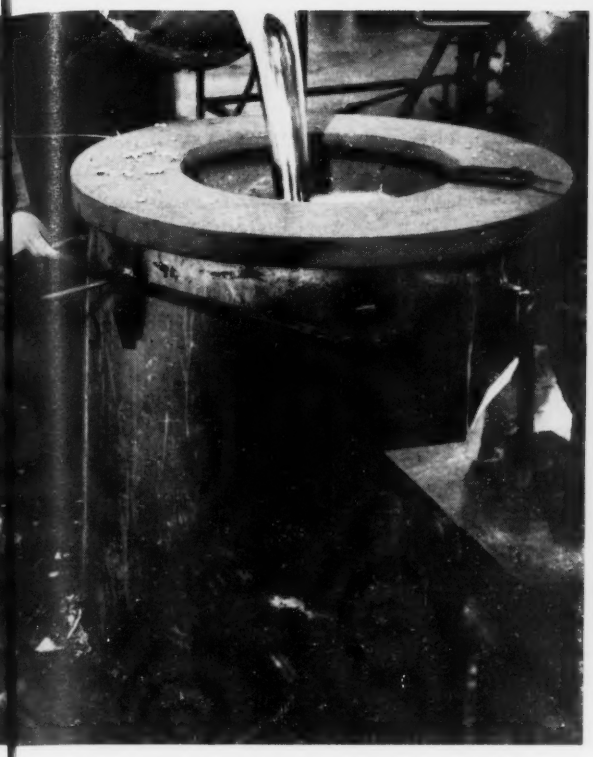


Fig. 2—Stationary furnaces hold previously melted metal. Degassing and refining treatments performed in them free melting furnaces during that treatment

Campbell-Hausfeld Co.

Fig. 3—Tilting furnaces are used widely in aluminum alloy foundries. Molten metal is transferred from them to small ladles used for pouring molds

PRACTICE

By HIRAM BROWN
Company Chief Metallurgist
Solar Aircraft Co., Des Moines, Iowa

Microporosity is the occurrence of gas in shrinkage areas. This can result from decreased solubility of hydrogen in solid metal or formation and precipitation of gas in the solidifying melt.

Pinhole usually is visible to the eye on a machined or sawed surface and is scattered throughout the metal as shown in Fig. 4. If pinhole is moderate, holes may be rounded, but if a large amount of gas is present the holes will tend to be more angular. Microporosity is usually found only by x-ray or microscope and is in localized areas. Pinhole porosity seldom causes leaks, but microporosity is a source of leaks due to the channel nature of its interconnected voids, and the fact that it is found to occur in shrinkage areas.

TABLE I—Hydrogen Solubility in Nonferrous Metals[2]
(Solution of hydrogen in cc per 100 grams metal)

Metal	Solidus	Liquidus	212° F Over Liquidus	392° F Over Liquidus
Aluminum	nil	0.2	0.6	1.4
Copper	2.0	5.3	10.0	14.0
Nickel	18.5	39.0	41.0	...

Aluminum and magnesium have only hydrogen to worry about since the metals form insoluble oxides, nitrides, carbides, etc., which usually remove themselves from the bath. With copper alloys sulphur dioxide, carbon monoxide, carbon dioxide or metallic oxides can react in the melt with any reducing compounds in the metal and release hydrogen which accentuates porosity. Nascent or atomic hydrogen causes the trouble, not molecular hydrogen.

Pinhole and microporosity decrease as pouring temperature decreases, since less hydrogen is dissolved at lower temperature.

Melting Metal—Since hydrogen is the chief cause of porosity in nonferrous alloys, furnace atmospheres should be neutral or slightly oxidizing. Orsat analysis will tell composition of the furnace atmosphere. If conditions are proper the exit flame should be blue or blue-green. A cold piece of zinc passed through the flame will show a black carbon deposit if flame is reducing and practically no discoloration if flame is neutral or oxidizing. Proportioning burners and comparatively constant air and fuel pressures are of great help in maintaining proper flame conditions.

In the writer's opinion the value of cover fluxes during melting is highly overrated, except in the case of magnesium where they are vital. Fluxes often cause inclusions in aluminum castings, and due to their hygroscopic nature, may even introduce moisture into the molten metal which will result in gas porosity. In the case of copper-base alloys a reducing cover such as charcoal may contribute to porosity, and a glass cover actually prevents proper contact between metal

and whatever oxygen is in the furnace. Furthermore, glass attacks crucibles, and sand, if used for a cover, may get into metal and be trapped.

High-zinc brasses and manganese bronze are not prone to absorb hydrogen so usually no degasification is required. In most other cases copper alloys are usually oxidized by use of copper oxide, borax, and silica. This is followed by a deoxidizing treatment with 15 per cent phos-copper.

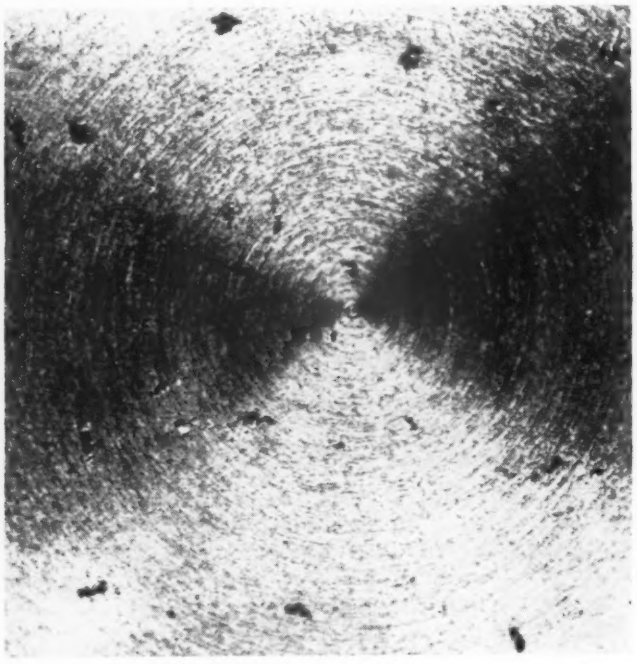


Fig. 4—Pinhole porosity usually is visible to the eye on a machined or sawed surface and generally is scattered throughout the metal as shown

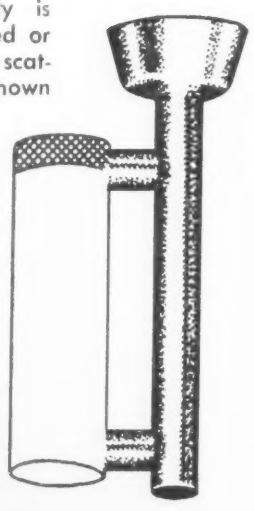
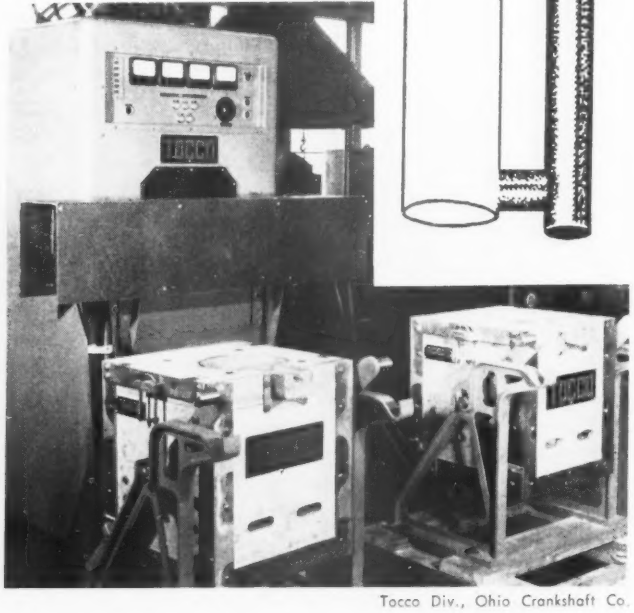


Fig. 5—Hot shot gating helps get hot metal into the riser when bottom pouring is used



Tocco Div., Ohio Crankshaft Co.

Fig. 6—High-frequency furnaces melt rapidly and develop a stirring action in the bath. The furnace shell may be lifted by crane for pouring off molds

It has been found that the solubility of hydrogen in metals is proportional to the square root of its partial pressure. It will diffuse into an inert atmosphere if held for sufficient time. This had led to degassing by use of dry nitrogen or chlorine. As the dry gas bubbles through the bath the hydrogen diffuses into the bubbles and is carried to the top of the bath and released to the air. This is a surer, more consistent method of degassing than the use of fluxes, deoxidizers, etc.

Do not superheat metal any more than is necessary to pour castings. Do not use gates or ingots for cooling metal. Add any lost elements, such as zinc or magnesium, just before pouring. Use pyrometers to check temperature of metal. Hold lip of pot as close as possible to ladle when transferring metal, and hold the lip of the ladle as close as possible to the mold during pouring. Pig any remaining metal into graphite or iron molds rather than into sand molds.

Sand Control—Use sand testing equipment and control properties regardless of whether sand is natural or synthetic. A good natural sand is Albany No. 1 or equivalent. For light metal castings where good finish is required Albany No. 0 often is used. In general, sand should be AFS 100-200, permeability 12-25, green bond 5½-8½ lb, clay 15-20 per cent, and moisture 6-7 per cent.

For copper-base alloys, aluminum paint on mold faces, chills, or on chill molds will inhibit gas absorption in mold. Best results are obtained when it is applied to areas of slow cool such as bosses and junctions of sections. The paint must have a strong resinous or oily base.

Gating Practice—Actual practice will vary with each alloy, so only general statements can be made. Bottom gating is necessary to prevent excessive drossing of alloys of aluminum and magnesium and of copper alloys such as aluminum bronze and manganese bronze. Generous risers must be used to insure adequate feeding. Where top gating can be used without excessive drossing of the metal good results have been obtained since top pouring actually gives the best conditions contributing to directional solidification. Where bottom pouring is used hot shot gating into riser is helpful in getting hot metal into the riser. This is illustrated in Fig. 5.

For bottom pouring, reverse horn gates—big end down—are preferred since this reduces pressure and agitation of metal. Screens, skim cores, or choked runners near down sprue also are beneficial. If skimmer screens are used under riser they should have a hole in the center to permit feeding during solidification of the metal.

Rectangular sprues reduce swirling tendency of metal as compared with round sprues. On the other hand, square or rectangular risers offer the maximum area for radiation of heat as compared with volume of metal they hold. If it is desired to keep risers molten for longer periods of time, round risers should be used. Furthermore, the final solidification of metal in a round riser occurs at the center, so feeding can occur there after edges are solid.

Necked-down or knock-off (*Please turn to page* 236)

How to build Good Will with Neighbors and Employees

By ROBERT H. HERRMANN
Associate Editor

GOOD community relations and a morale-building attitude in dealing with advancement of employees are strong points at American Foundry Co., Indianapolis. Although the company boasts no organized public relations department nor any planned program in that field, it nevertheless enjoys a mutual feeling of kinship with community folk. That is because it believes in and practices an old American custom.

The company takes the initiative in any co-operative, helpful, or considerate action for which it sees a need. Such action in many cases forestalls a possible complaint or lawsuit, but more often it is simply another block in the structure of good neighborliness.

Because foundries seldom sell their wares directly to consumers, and castings usually lose their identity in the final product, it often has been felt that the building of consumer acceptance and good will is an unnecessary effort and expense. The modern trend of opinion, however, has swung gradually away from that concept. One of the factors responsible for that swing is the fact that foundries must recruit workers from the community in which they operate. Good community relations can be the determining factor in attracting desirable applicants to fill job vacancies.

Perhaps the best way to illustrate how American Foundry Co. builds public acceptance is to cite a few of its experiences.

A Friend in Need—Last summer a spark from a passing train set fire to a field near the foundry. An old farm house occupied by an elderly widow is located on the same property. The fire and peril to the woman and her house were spotted by foundry personnel. Immediately a couple of the foundry's trucks and a group of foundry workers armed with fire fighting equipment were dispatched to the scene to fight the fire. The men divided into two groups—one prevented spread of the fire to the woman's house and the other protected foundry property. In the meantime a call had been put in to the local fire department, but shortly thereafter, when the municipal firemen arrived the fire was well under control.

Workers and management were commended by the fire chief for their quick and competent handling of a dangerous and potentially serious situation. Needless to say, the woman's personal "thanks" was sincere and grateful. But beyond that, one's imagination need not go far to see the favorable reaction of people in the Indianapolis suburb where the foundry is located when the woman related the story to the local groceryman and to her friends in the sewing circle. News has a way of getting around.

Sharing the Lot—Just recently the company bought a lot next to their scrap yard. Many private homes are located in the area. An old building is to be removed from the property and the area graded. The company wants to build a fence around the property, but before the fence is built the neighbor immediately adjacent to the lot will be contacted so that he may specify what kind of a fence he wants. He may have some ideas of what fits in with his landscaping plans, and the fence he selects will be erected.

During the work-week the lot will be used as a parking area for employees' cars. And it is the company's plan that if the neighborhood accepts the lot in the correct manner—that is, if hot-rod enthusiasts do not use it for a racing ground, if the fence is not damaged, and if rubbish is not strewn around the area—playground equipment will be installed on part of it for use by neighborhood children. A baseball diamond, back-stop and basketball hoops will be built in that area used for parking so that ball games can be played in the evenings and on week-ends.

Cleaning the Air—Before the company's new foundry was built on Tibbs Ave. about 3½ years ago, all operations were centered in an older plant located on Naomi St. in Indianapolis proper. Complaints were received from neighbors (*Please turn to page* 242)

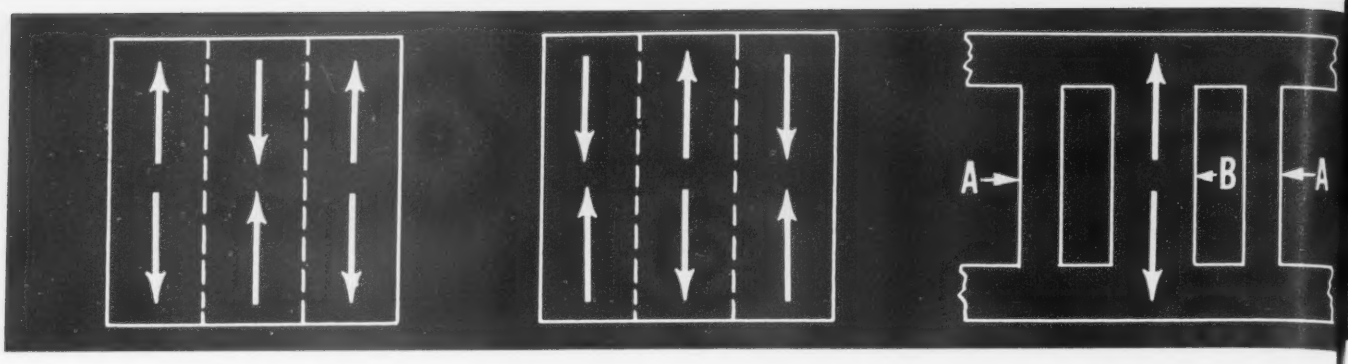


Fig. 1—Direction of stresses in a solid cylinder during cooling

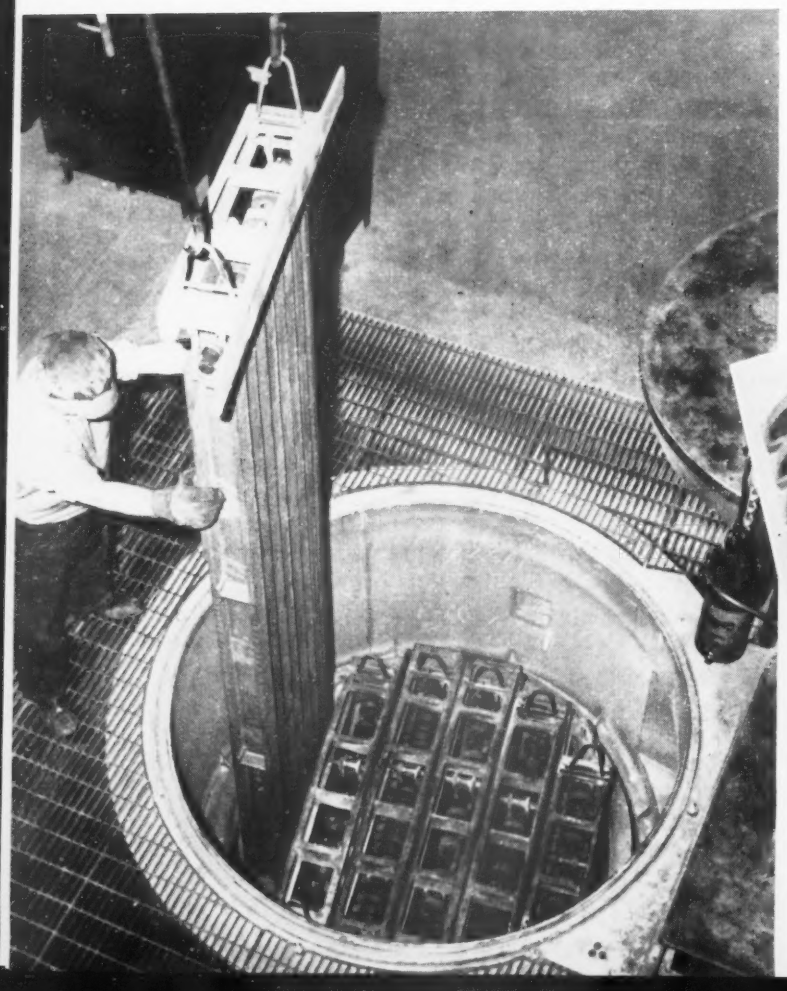
Fig. 2—Stress direction reverses as core of cylinder cools further

Fig. 3—Outside sections will cool faster than thicker one in center

Stress Relief of GRAY IRON

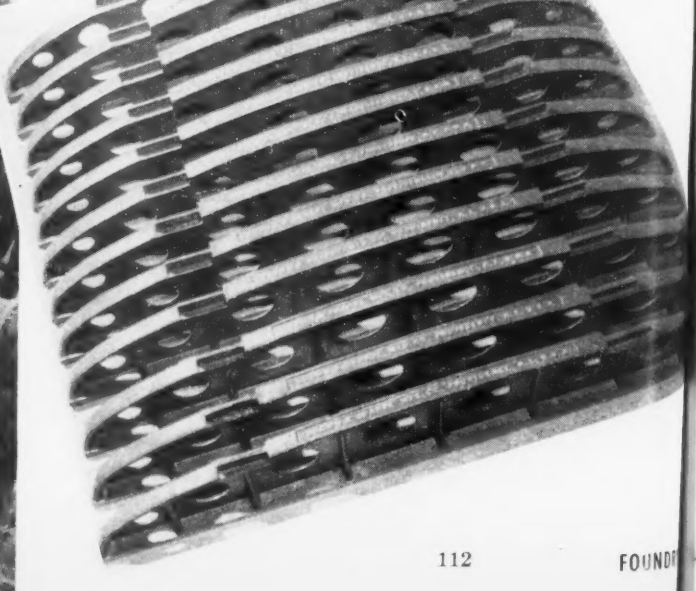
Causes and ill effects resulting from internal stresses in gray iron castings are discussed in this first of two articles. The material is from a forthcoming manual being prepared by the Gray Iron Founders' Society covering heat treatment of gray cast iron

By CHARLES O. BURGESS
Technical Director
Gray Iron Founders' Society



Left—Cast beams for a textile machine being stress-relieved in heat treating furnace at 1000 F. (Courtesy Textile Machine Works)

Below—Straight-edges ready for stress-relief at 950 F. (Courtesy Brown & Sharpe Mfg. Co.)



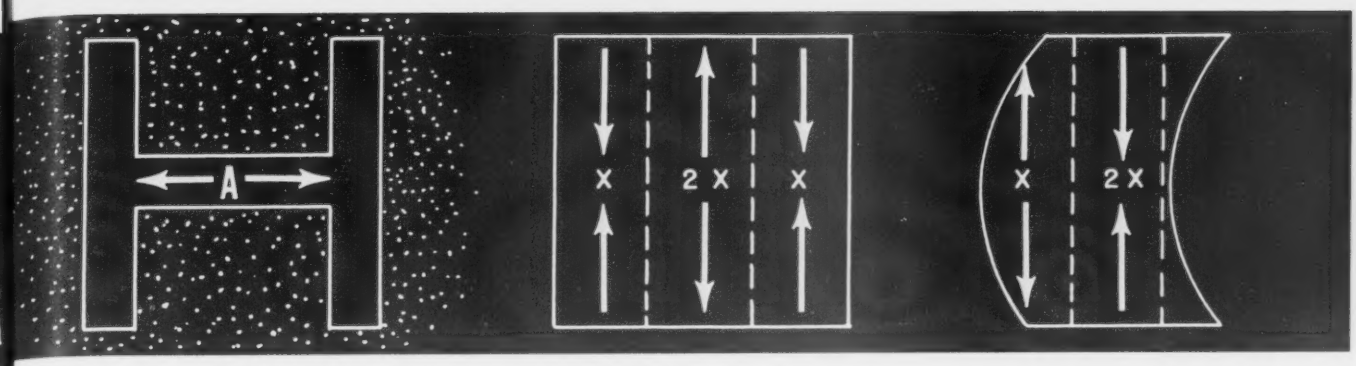


Fig. 4—Mold hinders contraction, sets up a stress in the cross-bar

Fig. 5A—Balance exists between core and outer section stresses

Fig. 5B—Machining outer section upsets balance between stresses

GRAY iron in the as-cast condition, like any other metallic casting cooled from elevated temperatures, is subject to internal stresses. This is due to the fact that the rate of cooling in different sections is never exactly the same, a condition which leads directly to an uneven rate of contraction in various parts of the casting. The resultant residual stresses, although less in gray iron than in other ferrous castings, may reduce its strength, can cause distortion and, in some extreme cases, may even result in failure or cracking of the casting.

The extent of these stresses is dependent on the shape and dimensions of the casting, on the casting technique employed, on the composition and properties of the material cast, and finally on whether the casting has been submitted to a stress relief treatment.

To a great extent, the seriousness of the stresses can be minimized without recourse to stress relief by proper design, proper casting technique and the use of a material with a proper balance between strength and shrinkage properties. The low shrinkage and wide strength range of gray iron are, of course, very advantageous in minimizing such internal stresses. Also, in certain of the softer gray iron grades, slight plastic flow at stresses under the elastic limit helps to prevent these stresses reaching critical levels. Nevertheless, in a number of cases, residual stresses in castings seriously lower efficiency, and it is not sufficiently recognized that, even in the case of gray iron, the relief of internal stresses by some form of heat treatment is frequently desirable and sometimes essential.

Causes of Internal Stress—There are three main causes of internal stress:

1. Differential cooling or contraction within a single section due to more rapid cooling of the surface as opposed to the interior of the section.
2. Differential cooling between two or more sections.
3. The resistance of the sand mold itself to shrinkage and contraction of the casting.

The first cause of internal stresses can perhaps best be understood if the case of a particular casting is considered. If a solid cylinder is cast and allowed to cool in the mold, the outer portion of the cylinder will, of course, cool more rapidly than the core and will thus shrink more rapidly. If we consider for the moment only the axial stresses (i.e. those parallel to the axial of the cylinder), it is evident that stresses in directions shown by the arrows in Fig. 1 will prevail. Thus in Fig. 1 the outside layers are in tension and the core in compression. Since the cylinder as a whole is still at a sufficiently elevated temperature, plastic deformation of the core can readily occur and will largely relieve the compressive stress in the core. However, when, upon further cooling, the core of the cylinder, in turn, contracts, the stresses are reversed, as shown in Fig. 2.

The hotter core material continues to cool and attempts to contract while the surface layers have already reached so low a temperature that the resultant contraction stress can no longer be relieved by plastic deformation, and the stresses shown in Fig. 2 remain locked in the casting.

In the case of a casting, however, stresses arising from differential cooling between two or more sections of a casting are of greater significance than stresses within a single section of the type shown in Figs. 1 and 2. The latter stresses normally are considered only where absolute alignment must be maintained in a machining operation. The slow cooling in a sand mold, in fact, reduces them automatically to a point where they seldom influence physical properties adversely.

On the other hand, as already noted, stresses arising from differential cooling of independent parts of the casting, either due to different section thicknesses or to their location in the casting, are much more severe. The resultant different cooling and contraction rates can and have produced very appreciable and sometimes critical stresses.

This problem arises more often with castings for the simple reason that casting permits more complex parts to be produced as a single integral component than is possible using other methods of construction. For example, assuming that it is necessary to

produce a casting of the design shown in Fig. 3 (actually such a design should naturally be avoided if possible), it is clear that the two smaller outside sections "a" will cool more rapidly than the thicker central section "b." Thus, before the central section "b" has completed its shrinkage, the comparatively cold sections can no longer be plastically deformed and thus absorb the stress produced by the shrinkage of the "b" element. In other words, the structure is rigid, setting up a tensile stress in the thicker or more slowly cooling section "b" and a compressive stress in the thinner "a" sections.

Although in gray iron these stresses rarely reach proportions sufficient to crack the casting, they may lead to distortion and lower the strength of the castings in certain applications. As in the previous instance, the internal stresses arise from the existence at a given moment of a difference in temperature between two or more parts of the casting during cooling.

The third case of internal stresses is easily seen by a consideration of Fig. 4. The contraction of the casting while still in the mold is hindered in this case by the mold itself, so that a tensile stress is set up in the cross-bar "a."

From these examples some idea can be gained of the desirability, and sometimes the necessity, for again heating castings of uneven section size or cooling rate to a temperature at which the material will be sufficiently plastic to yield and eliminate any existing internal stresses. The need for such stress relief is intensified if the casting is to be employed in a very critical application.

A further complication that may develop in any ferrous casting, and one which can develop special stresses, is the change in volume, i.e. the expansion which accompanies the cooling of iron through the critical range. This is not important at normal cooling rates but should be considered on very rapid cooling or quenching a casting from temperatures above about 1500°F.

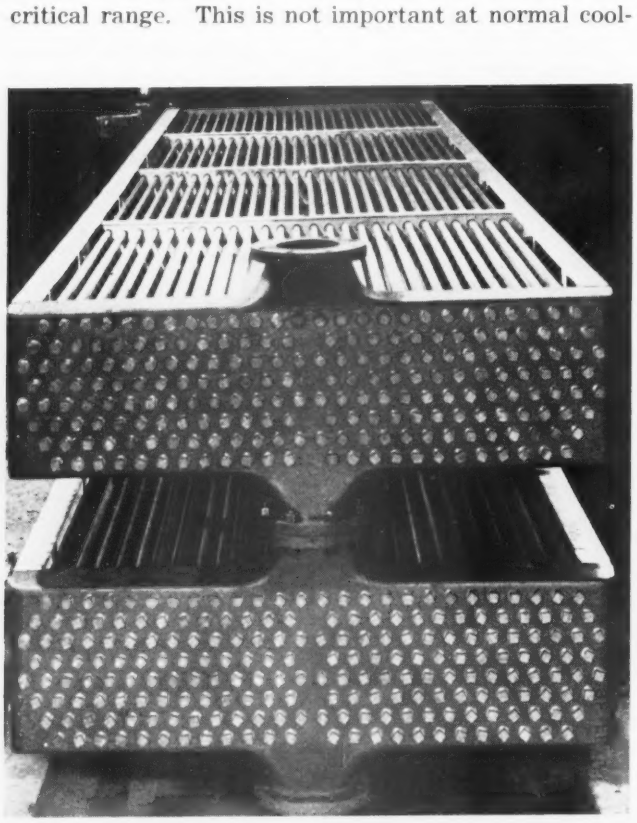
Results of Internal Stresses—The necessity for relieving internal stresses formed in any of the above ways is dependent on their magnitude. Although because of the expansion accompanying graphite formation and the low co-efficient of contraction, these stresses are less in gray iron than in other cast metals, they can, as already noted, reach a point where (a) the strength of a casting is decreased, (b) distortion follows cooling or machining or (c) cracking will occur in very severe cases. These possibilities should be kept in mind in determining whether stress relieving is advisable.

As concerns lowered strength, it can easily be understood that if an iron of, say, a tensile strength of 35,000 psi has in one of the three manners noted above acquired an internal tensile stress of 10,000 psi, it will have in service an effective tensile strength of only 25,000 psi. Such a stressed condition can conceivably result in failure of the casting when it is subjected to a service load materially lower than the normal tensile strength of the metal used in the casting.

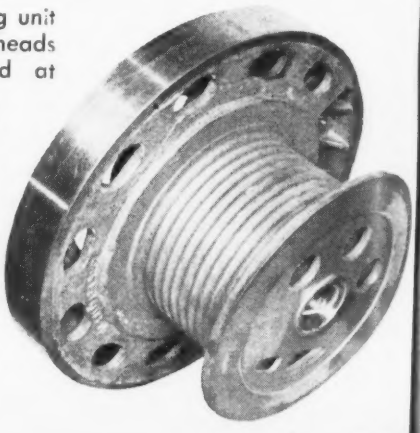
The second, and often the most important, commercial consequence of internal stress, is distortion of the casting, a condition which may not show up until the part is machined. The reason for such distortion can be understood if we take the case of a plate such as that shown in Fig. 5a, in which a balance of stresses exists between the core (2x) and two outer sections (x + x = 2x). If one of the outer sections were to be machined off as in Fig. 5b, this balanced system would be upset, and the stronger stress may cause distortion of the casting. If the stresses are relieved before machining, this distortion can, of course, be prevented.

In the last case, that of cracking, the induced internal stresses have exceeded the ultimate strength of the material, causing fracture even before the casting is subjected to a service load. Although this is not a common occurrence with gray iron (the "hot-tearing" familiar to steel foundrymen is, for example, rare in an iron foundry), it is possible, and should be taken into consideration when the casting is designed. Incidentally, cracking is more common in white iron than gray iron because of the former's greater contraction and lower inherent plasticity.

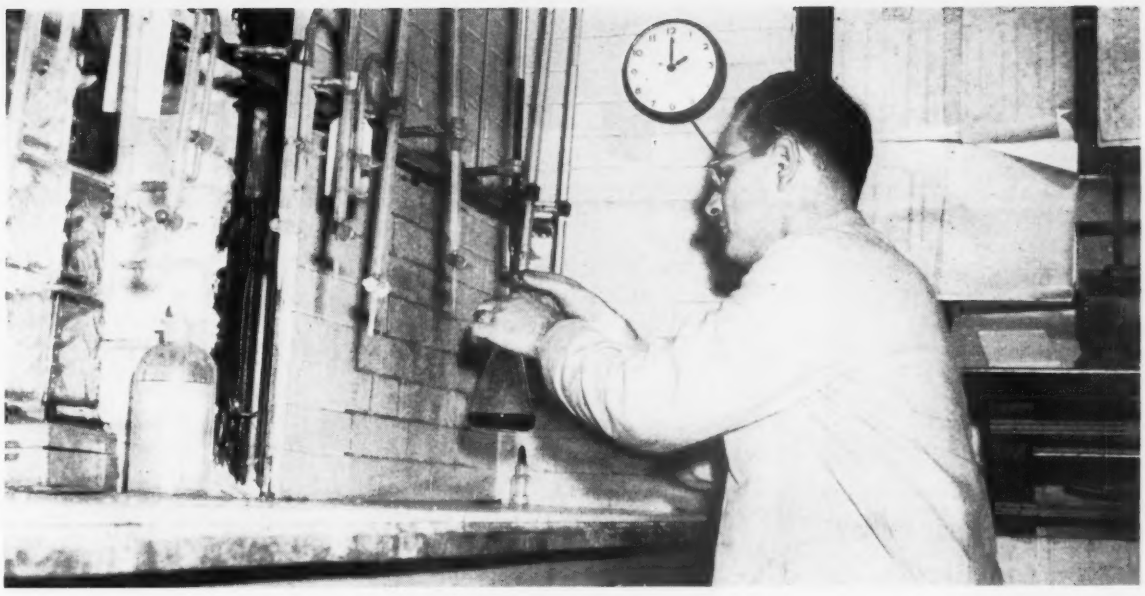
(To be concluded next month)



Left—Large cooling unit with cast iron heads was stress-relieved at 1100°F. (Courtesy Acme Foundry & Machine Co.)



Right — Power shovel control cable drum stress-relieved at 1250°F. (Courtesy Altens Foundry & Machine Works)



Volumetric Procedure for

ANALYSIS OF TIN IN COPPER-BASE ALLOYS

By RAY RAPPORT
Chief Chemist
SiPi Metals Corp.
Chicago

THE trend in industry today points toward a quickening pace, without sacrificing established standards. During the last few years the analytical field has been expected to meet this challenge, but commercial and industrial laboratories have been slow to adopt new ideas which would keep them in step with industry's demands. Slow and cumbersome methods have been prevalent until recent developments have turned our thinking in the direction of a rapid and dependable procedure.

The determination of tin in its alloyed state has been not only time consuming, but very critical in its result. We have discovered that, by minimizing the possibility of human error through simplicity of operation, we can secure the accuracy expected of us.

The time-worn gravimetric method can be found most commonly used in control work today. Its greatest faults lie in the lengthy digestion period, incomplete precipitation due to interference of other elements, and the occlusion of other metals. Iron, antimony, and phosphorus are the greatest offenders. Volumetric methods likewise consume considerable time with the use of solid metals in the role of reducing agents. Experience proves that additional time and attention is needed to effect the complete separation of tin from solution.

In Sherman's[1] method, the reducing agent was found to be useful; however, the reducing time varied without control. The ammonia precipitation of high tins was found to be too bulky to wash thoroughly. Further work with the Kinnunen and Meukanto[2] method brought out enough improvements and conditions to warrant the writing of this new adaptation of the hypophosphorus acid reduction of tin.

We have established the procedure described here which, it will be noted, requires no separation of any kind. A blank may be used to secure a constant factor on all ranges of tin content. The table below shows results obtainable by this method.

Tin Determination in Copper-Base Alloys

Solutions

Dilute Hydrochloric Acid: 500 ml water and 300 ml hydrochloric acid.

Ammonium Thiocyanate: 500 gram ammonium thiocyanate to one liter.

Potassium Iodate: 1.8 gram KIO_3, 5 gram KI and 1 gram potassium hydroxide to one liter.

Procedure

1. Dissolve 1.0-gram sample in a 500 ml Erlenmeyer flask with 20 ml hydrochloric acid and 15 ml of 30% hydrogen peroxide.
2. When violent action ceases, place on hot plate until solution starts boiling clear.
3. Add 80 ml dilute hydrochloric acid and approximately 0.3 gram $HgCl_2$ and 10 ml of a 30% hypophosphorous acid.
4. Raise to a boil and continue to boil on hot plate for five minutes or until almost clear.
5. Place under running water, keeping under a CO_2 atmosphere with 20-grain sodium bicarbonate pills. Cool to approximately 15° C.
6. Add 10 ml 50% NH_4SCN solution, 5 ml 10% potassium iodide solution and approximately 0.1 gram cold water starch and titrate to a persistent blue with potas ium iodate.

Bureau of Standards No.	Per Cent Tin Present	Per Cent Tin Found	Deviation
52b	8.00	7.97	0.03
62b	.96	.99	0.03
124b	4.93	4.93	0.00
63b	9.78	9.76	0.02

The simplicity of the procedure makes it adaptable to all types of alloys. Experimental work has shown that this method may be used satisfactorily with only a slight revision.

References

1. M. Sherman, FOUNDRY, 77, No. 2, 87 (1949)
2. Kinnunen and Meukanto, *Chemist Analyst*, Vol. 41, No. 1 (1952)

QUESTIONS

Describes methods of producing a large pulley . . .

Gives information on number of cupola brick needed . .

Must stiffen thin core . . . . Make ornamental bronze

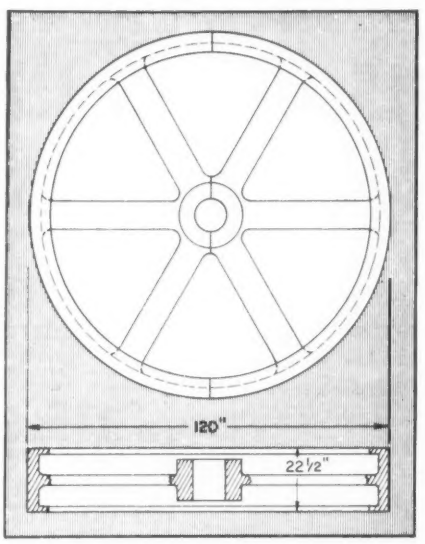
Making Large Governor Pulley

QUESTION We are preparing to cast a governor pulley 10 ft diam, 22½ in. face, 4½ in. thickness of rim for one of our engines. The casting is split in the center in the usual manner, but is cast as a unit. Would knock off risers serve satisfactorily, and if so, please indicate diameter, height and number?

ANSWER Large, heavy wheels are molded according to several methods, depending on available rigging, established custom and skill of the molders. One of the potential hazards is the tendency of the mold to yield to pressure when filled with molten metal, with the result that the casting will be oversize and overweight. In many instances, due to the way metal sinks in risers, the foundryman is inclined to blame it on shrinkage. His first reaction is that more and larger risers are needed. What really is needed is a more rigid mold.

In the present example if the wheel was made in a loam mold properly curbed, the mold would not yield and the casting would not need large feeding risers. In a green sand or even a skin dried mold, prudence suggests the use of a 6 in. diam, 8 in. high riser on the top of the rim above each arm junction. Each riser is necked to 2 in. by use of suitable cut-off cores. Pouring ceases when the risers are partly filled. The remaining space in the risers is filled with fresh, hot metal from a bull ladle. Metal in each riser then is covered with a small shovelful of blacking. It is not necessary to use a feeding rod.

The casting may be molded according to any of the following methods: 1—Loam mold—swept inside and outside; outside swept first and removed temporarily while building inside—arms and hub formed in dry sand cores. 2—Swept in loam or dry sand; inside removed temporarily and dried in oven—outside part stationary and dried with coke baskets. 3—Dry sand slab cores laid up against outside of segment pattern; sand rammed behind cores in pit or curbing; dry sand slab cores laid up against inside of segment pattern—remainder of space under, above and between arm cores packed with floor sand. 4—Inside built first; green sand facing against pattern segment; coal dust in facing about 1 to 6—coated with dry plumbago, or blackwashed and skin dried with oil or gas torch—outside face formed with slab cores laid up against pattern segment. 5—Green sand facing inside and outside; segment pattern; lower flange pinned on pattern in sections to be drawn in later—no blacking—no drying—fairly clean casting.



Need rigid mold to prevent oversize and over-weight castings

In each of the foregoing methods the pattern, either segment or sweep, is provided with the usual draft allowance to compensate for strain when the mold is filled with metal. Sweeps for the rigid loam mold require little or no draft allowance. Segment or sweep for the green sand mold has maximum allowance ⅛-in. per ft inside and outside. Also in every instance where the mold is faced with molding sand instead of loam or dry sand cores, a coarse open grain sand is employed. It is rammed hard and well vented.

Brick Requirements in Cupola

QUESTION We are installing a skip charger on our No. 6 cupola, and would like some information on lining the cupola. Stack is slightly over 26 ft from bottom to top, but we have another section 7 ft 6 in. which we can add if necessary. How much air should be used and at what pressure?

ANSWER With reference to your No. 6 cupola, we might point out that the shell is 66 in. in diam and that the usual lining thickness is 9 in. in the section below the charging door and 4½ in. in the section above. Lower section is lined with cupola block termed 48-60, which means that the inside diameter of a circle of such brick is 48 in. and the outside 60 in.

These blocks are 6 in. deep and 4½ in. high with a 9-in. chord (also called 6-in. cupola block), and 21 are required to make a circle. Since a circle of such brick would leave a space between the circle and shell, a layer of 9 x 2½ x 4½ straight brick is placed against the shell. These have the 4½-in. face against the shell with the 9-in. dimension vertical. About 43 brick will be required for the circle.

Lining can be made straight from bottom to top, or it can be boshed by extending the block 2

ANSWERS

3 in. just above the tuyeres and then gradually tapering back to the straight dimension in the next four courses. We believe that the general practice in lining the section above the charging door is to use No. 1 arch (2½-in. series) and 9-in. straight brick. It will take 72 of the No. 1 arch and 12 of the 9-in. straight brick for a circle.

To calculate the total number of brick, you will have to determine the height in feet to be lined. If the circle is composed of brick 4 in. high, then three courses will equal a foot. If the circle uses brick 9 in. high, it will require 1⅓ courses to the foot.

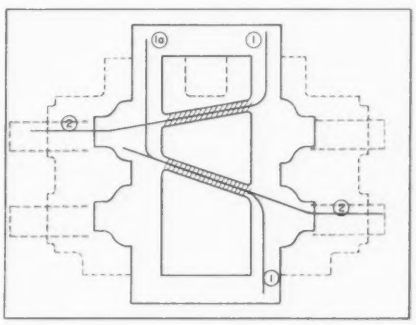
Although we do not know the height of your cupola above the roof, it appears that it might be a good idea to add on the extra section of stack. The added height will aid in giving a better distribution of dust, etc., over a wider territory. If, on the other hand, the present arrangement carries off smoke and fumes so that the charging floor remains clear of them there is no need to extend the stack.

For your cupola lined to 48 in. the blast supply should be 5000 cfm. and the pressure may range from 12 to 22 oz.

Core Requires Reinforcement

QUESTION One of our customers wants us to make a small aluminum alloy casting. We questioned the thinness of some of the core sections, but attempted to make some sample castings. We tried making sand cores without success, and then plaster cores which blew as you can see from the sample casting. A complete plaster mold with plaster cores blew even worse. Our customer states that the cores have been made in another locality. Have you any suggestions?

ANSWER As you indicate the sectioned casting sent to us shows considerable evidence of core blows which makes it somewhat difficult to envision if there are any more thin sections than those depicted by the cross-hatched sections in the accompanying sketch. You do not state why you had trouble with sand cores, but we suspect it might be that they were too fragile to handle. We believe that such difficulty can be overcome by imbedding thin wires in the passages, as shown in positions 1 or 1 and 1a. Probably a better arrangement would be positions



Thin sections of core should be reinforced by insertion of wires

marked 2 if the core passages could be extended as indicated. Particular arrangement of wires is to permit pulling out without breakage due to sharp bends.

While we cannot ascertain definitely, we suspect that you thought of stiffening up the core by joining the ends of the core to form a box-like section. Your difficulty with the plaster cores undoubtedly was due to presence of moisture resulting from the core not being dried sufficiently, or that after drying it was left lying around, and picked up moisture. Since the sections of the casting are somewhat heavy, it may be necessary to dry plaster mold and core to the point that some calcination occurs on the surfaces. Plaster requires more drying than sand.

Ornamental Bronze Founding

QUESTION We have a problem in our foundry and wonder if you can answer it. In the casting of highly ornamental bronze castings, what is the ideal pouring temperature for the 85-5-5-5 alloy? If molasses is used to saturate the face of the cope and drag, what is the ideal formula for mixing same with water? In the skin drying of the mold, what is the ideal method of drying, by charcoal fire on a steel plate or by infrared lights? What type of facing should be used on the drag?

ANSWER In your inquiry we note that you use the word "ideal" several times, and there is no gainsaying the fact that if such a state or condition existed, life would be simple. However, with all the variables involved in production of castings, a series of compromises must be effected to obtain satisfactory results. Too, one must not forget that individual preferences play an important part in the latter determination.

As one might expect, there is no specific pouring temperature for the 85-5-5-5 alloy, or any other alloy, which will be suitable for variations in section thickness, method of gating, etc. Usual range is given as 1950 to 2250° F, but with extremely thin section, it can be as high as 2400° F. Most suitable temperature for a given casting will have to be determined by experiment, and one suggestion along that line is the lowest temperature which consistently will produce full-run, sound castings.

Many ornamental founders spray the mold faces with molasses water to provide additional bond on the surface primarily and to produce a better skin on the casting. For that purpose one oldtime expert recommended a solution of 1 part molasses dissolved thoroughly in 15 parts water. We do not know just what you mean by saturating the

mold faces, but it is obvious that if the faces get too wet, the sand will slough off. One suggestion is 2 qt of molasses water to a 20 x 30-in. face.

In skin drying the mold faces, we believe that use of infrared lamps would be a much cleaner and healthier operation than use of charcoal on a plate and would supply uniform heat. A bank of lamps could be set up on 6-in. centers in a frame so that the lamps can be adjusted vertically for height to reach into pockets.

With relation to facing sands, there probably are as many different mixtures as there are users—each having his own pet formula. However, we understand that a mixture of 40 parts sand with 1 part corn flour will serve satisfactorily. As a general rule, the facing sand is screened on to the pattern through a fine sieve or riddle from a considerable height, then backed up with coarser sand.

Gray Color Due to Treatment

QUESTION We have an opportunity to supply an aluminum alloy casting to replace a sheet stamping of 24ST. However, the sheet has a dark gray surface which is desirable since the part is engraved, and the contrast between the two types of surfaces is important. Is there any way in which an aluminum alloy casting can be treated to obtain this apparently characteristically gray color of rolled sheet?

ANSWER We are not sure, but we suspect that the dark gray surface on the sheet aluminum alloy is produced by an anodization or oxidation treatment. Although there are several procedures for providing that coating, the two most commonly used are the chromic acid and sulphuric acid methods.

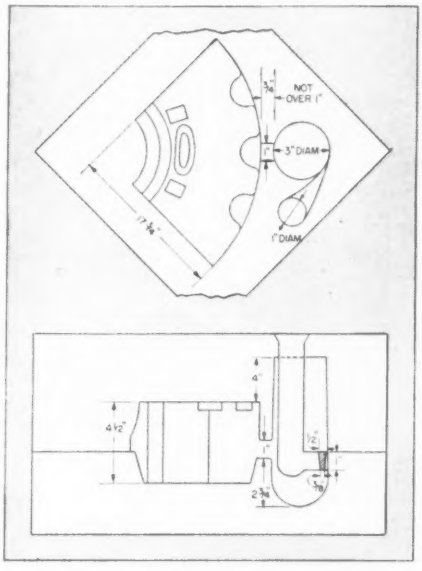
In the first, the castings are cleaned in a mild alkali bath, then rinsed with water. They then are attached to electrodes and immersed in a 5 to 10 per cent chromic acid bath maintained at about 95° F. Low-voltage dc current is applied and rapidly raised to 40 v. Castings are left in for 30 minutes at the top voltage. Current density ranges from 1 to 5 amp per sq ft. Castings are removed and rinsed in hot water at 180 to 212° F to seal the oxide coating.

With sulphuric acid, the bath is 10 to 15 per cent H_2SO_4 and the temperature 70° F. Castings are treated for 30 minutes at 15 to 20 v dc, and current density is about 14 amp per sq ft.

Shrinkage Causes Heavy Loss

QUESTION We have the problem of making a fairly porosity free wheel weight shown in the accompanying sketch. Rejects are heavy due to excessive shrinkage, mostly on the top side of the casting. Pattern equipment is an aluminum plate with one piece. Iron poured contains 2.35 to 2.50 Si, 0.5 to 0.6 Mn, 0.07 S, 0.20 to 0.25 P, and 3.40 TC. Would it be best to attach feeders or a gate just sufficiently large to pour the casting? If feeders are used should they be quite large? Possibly you could sketch gating system to produce a sound casting. It weighs 70 lb cleaned.

ANSWER Mention of porosity and shrinkage suggests the difficulty may be due in part to some other cause than improper gating. You do not give any information on how the casting is molded or gated, and there is the possibility that soft ramming may permit the mold walls to "give" so that the cavity is larger than when the metal first entered. In the meantime, the gate has frozen off so no feeding occurs. It may be that what you consider porosity might be due to an extremely coarse structure resulting from use of a "soft" iron in a heavy section. That can be corrected by reducing the Si content.



Gating arrangement suggested for making weight shrink-free

However, if you decide that your trouble is due to gating, we offer a system shown in the accompanying sketch. This is based on Winte and Barlow's work, and claimed to give good results with a wide variety of castings. Riser diameter of course, is adjusted to casting section thickness, and should be 60 to 80 per cent of the latter.

Scrap Analysis Not Uniform

QUESTION We are starting to make brass sweat fittings and plan to use 100 per cent scrap. Could you advise what should be added, and in what amount to make good castings?

ANSWER Presumably by brass sweat fittings you refer to those which are soldered to copper or brass piping for water lines, etc. We believe that either the 85 per cent Cu, 5 per cent Sn, 5 per cent Pb and 5 per cent Zn alloy, or the 81 per cent Cu, 3 per cent Sn, 7 per cent Pb and 9 per cent Zn alloy should serve.

However, we doubt that you can approach those compositions by melting miscellaneous brass scrap. The only way we can think of would be to melt the scrap, pour it into ingots, analyze the ingots, and then make the necessary adjustments to meet the selected composition.

Require Skill To Design Mold

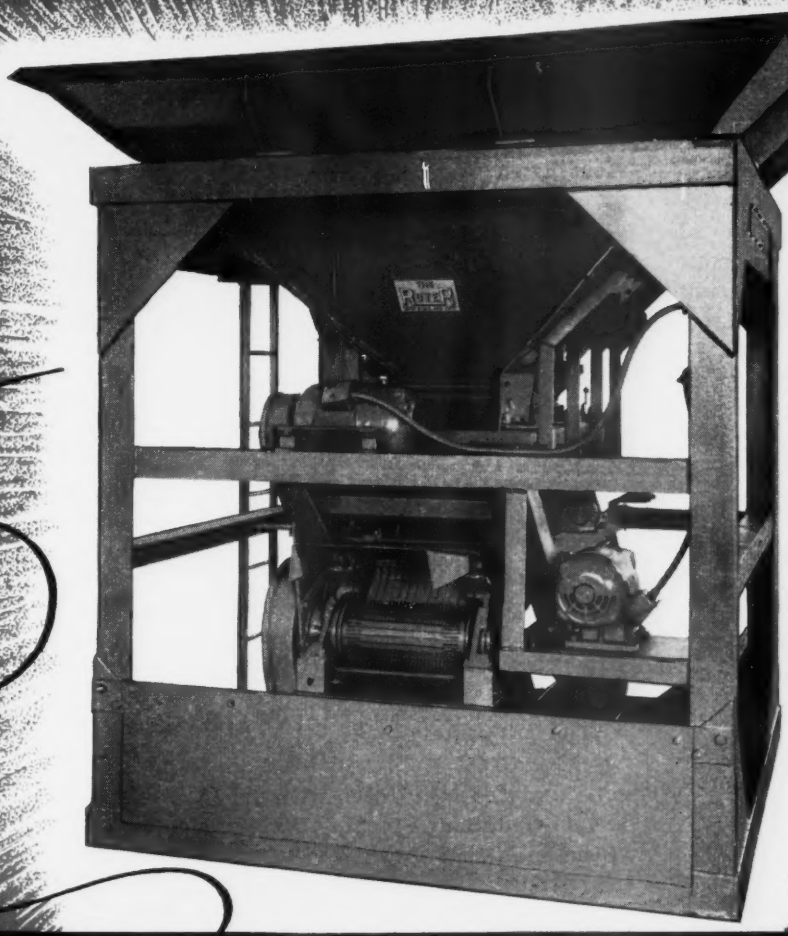
QUESTION We presently are casting irrigation fittings in sand molds and are forced to change to permanent molds. Can you give us any information on the latter?

ANSWER So far as we know, there is no book published which gives information on designing and making permanent molds, and your only recourse is to do some experimental work or to have your molds made by some firm with the requisite experience in the field. Rough rule of thumb for permanent molds is that they should be three to four times the thickness of the casting section and follow the contour of the casting, but those conditions cannot always be met

In the first place, requirements of rigidity and sturdiness in the

(*Concluded on page* 120)

Built-in MAGNETIC SEPARATION



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(*Concluded from page* 118)

mold limit the minimum thickness to 5/8-in., and likewise an extremely heavy mold section might cause difficulty in making a satisfactory mold, or make it unwieldy. In such cases, therefore, cooling is accomplished by use of ribs, studs, inserts, etc., to provide greater surface for radiation or for more rapid heat conduction.

Gating must be designed to admit metal into the cavity with minimum turbulence. Joints of the mold should contain narrow grooves at various points to permit elimination of air and gases from the mold cavity. Where possible, heavy sections of the castings are located along the joint line so that they can be fed by the gating system.

Fine Sand for Smooth Casting

QUESTION We shall appreciate information on a suitable spray or coating for molds and cores to produce a clean smooth surface on our aluminum castings.

ANSWER Aluminum foundrymen do not use any coating or spray on their molds and cores. The technique is confined to the ferrous branch of the industry and to molds for heavy bronze castings. The reason of course, is that a protective coating is not necessary. Molten aluminum is poured at temperatures ranging from 1250 to 1400°F, while the ferrous metals are poured at temperatures ranging from 2500 to 3000°F.

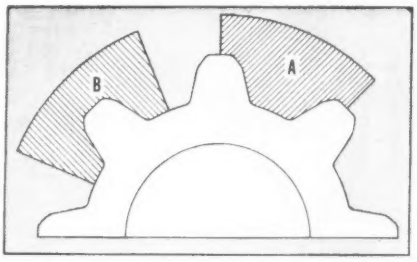
Highly refractory sands are needed in molds filled with high temperature metal. These sands are open grain or coarse in structure. The refractory coating sprayed or painted on the mold face produces a smooth surface. A corresponding smooth surface is imparted to the casting. Aluminum foundrymen employ a fine grain sand which imparts a smooth face to the casting without any auxiliary coating. A possibility exists in your case that the sand—suitable in itself—is rammed too hard or contains too much moisture. Either one, or a combination of these two items will cause metal to boil in contact with the sand. The result is a rough, dirty, scabby face on the casting.

Chilled Rim Sprocket Wheels

QUESTION Can you suggest a practical method for producing chilled iron rim sprockets?

ANSWER Usual method of making chilled rim sprockets is by use of segmental cast iron chills, split as indicated as *a* and *b* in the accompanying sketch. That means of course, that you have to make sets of chills for each type and size of sprockets—the number of sets for each depending on how many sprockets are to be made in a day. Chills of course must be kept clean and dry at all times.

Another method would be to make segmental cores of baked



Segmental iron chills harden the tooth surfaces of sprocket wheel

sand and coat the faces with tellurium-containing paint. Austin in the July, 1949 issue of FOUNDRY described such a paint or wash as being compounded of 32 grams tellurium powder, 60 grams silica flour, 6 grams aluminum oxide powder and 2 grams iron oxide—thoroughly mixed in the dry state, and then shaken up in 4 qt water. Graphite is added with shaking until density of the solution is 27° Be. Before use 1/4-pt core gum mixed in hot water to the consistency of molasses is added. Mixture should be stirred well before use.

Is Troubled with Penetration

QUESTION We are having considerable trouble with penetration of center cores on a tellurium mix in our chilled iron. The cores are made with a heavy oil mix and coated with a good steel core wash.

ANSWER It is difficult to give a definite reason why penetration occurs in the cores you mention, and we can only point out some possible causes. You mention that you are using a "heavy" oil mix, and there is a possibility that the cores are underbaked. We suggest reduction of oil for the sake of economy.

Another thought is that under the particular conditions of temperature and ferrostatic pressure, the sand is too coarse and permits penetration even when coated. Last, but not least, is that the core wash may crack or spall off.

Producing Thin-wall Bearings

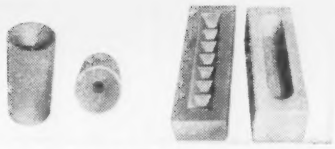
QUESTION In our country we know FOUNDRY as a periodical giving good information on the foundry industry, and we would like to know whether there have been any articles on making chill-cast bronze bearings of small diam about 1 3/16 in. OD, 3/4-in. ID, and 11/8 in. long. Also on casting those centrifugally.

ANSWER We do not recall any articles relating to the production of chill-cast bronze bearings with such thin walls and of such length as you indicate, and we are doubtful that they could be made by either method you mention. In centrifugal casting the difficulty would be in trying to introduce the molten metal into the mold through the small opening. With the length mentioned we believe that the mold would have to be spun in a horizontal position, and a spout the length of the mold would have to be employed.

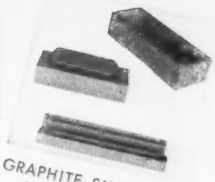
Possibly with bushings or bearings about 3 to 4 times the diameter mentioned, the mold could be spun on an axis of about 45° to the vertical and poured with use of a short spout to direct the metal stream to the center of the bottom. However, it appears that the mold would have to be almost in the vertical position to accomplish that—and we do not know how high up the sides the metal would run before freezing.

We suspect that the same thing would occur in still or static casting in a metal mold or with use of a metal core—that you could not get the metal into the mold fast enough. Perhaps it might work with a shorter length. The only way to find out whether such work can be done is to try out various schemes on an experimental basis. Perhaps the problems mentioned are more apparent than real, and can be overcome with some ingenuity on your part.

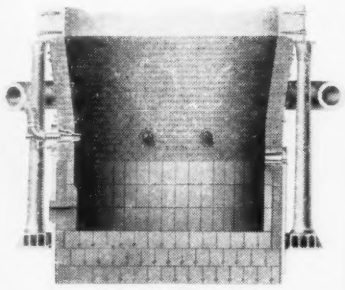
GRAPHITE CRUCIBLES



GRAPHITE MOLDS



GRAPHITE SINTERING BOATS & TRAYS



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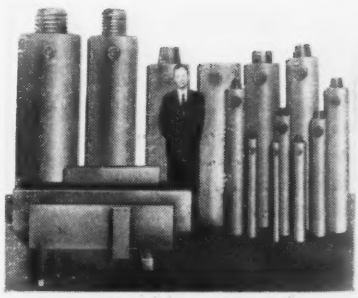
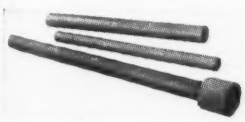
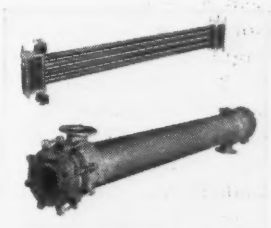


CARBON & GRAPHITE ELECTRIC FURNACE ELECTRODES



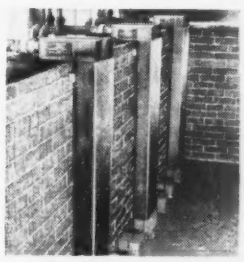
GRAPHITE FLUXING TUBES

CARBON LININGS FOR RUN-OUT TROUGHS



"KARBATE" IMPERVIOUS GRAPHITE HEAT EXCHANGERS

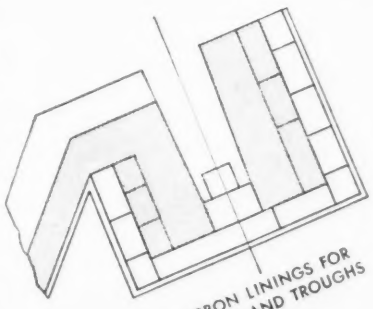
CARBON CINDER NOTCH LINERS



"KARBATE" IMPERVIOUS GRAPHITE PLATE HEATERS AND CARBON TANK LININGS

NO OTHER MATERIAL PROVIDES THIS COMBINATION OF PROPERTIES!

- Chemically inert
- Does not melt
- Low coefficient of thermal expansion
- Good thermal conductivity
- Excellent electrical conductivity
- Non-contaminating
- Resists wetting by molten metal and dross



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Men of Industry

R. V. RIGHTER has been appointed manager of the Danville, Ill., plant, Central Foundry Division, General Motors Corp., succeeding **S. D. Martin** who is on leave of absence due to ill health. **L. F. Corp** has been named manager of the Saginaw Malleable Iron Plant, Saginaw, Mich., and **F. J. McDonald** has been made manufacturing superintendent there. Mr. Righter, a graduate of University of Illinois, was engaged in personnel direction at the Saginaw plant from 1943 to 1950, when he became manager of that plant. Mr. Corp, with Central Foundry Division since 1926, worked in supervisory positions at Saginaw, Danville and the Lockport, N. Y., plants, and became manufacturing superintendent at Saginaw in 1949. Mr. McDonald entered the Saginaw plant in 1940 as a co-operative student and following Navy service, returned there and held various positions in production and manufacturing, more recently as assistant to Mr. Corp.

♦ ♦ ♦

Jesse J. Baum has been appointed supervisor, American Cast Products Inc., Orville, O., subsidiary of Hagan Corp., Pittsburgh. Mr. Baum, who received his metallurgical training at Carnegie Institute of Technology, recently was associated with American Steel Foundries, East Chicago, Ind. Previously he was a foundry superintendent in Chile, and served in supervisory capacities with National Tube Co., Lorain, O., Duraloy Co., Scottdale, Pa., Allison Engine Division, GMC, Indianapolis, and Borg-Warner Corp., New Castle, Ind.

♦ ♦ ♦

H. L. Ingram Jr., has been appointed manager of the technical development department, Air Reduction Sales Co., New York. Mr. Ingram, who has been with Air Reduction for 18 years, spent 5 years with the applied engineering department, 5 years with the gas sales department and 8 years as special Washington representative.

♦ ♦ ♦

Gordon W. Johnson has joined Alloy Engineering & Casting Co., Champaign, Ill. Since 1950 Mr. Johnson has been supervisor of foundry process research, Armour Research Foundation, Illinois Institute of Technology, Chicago. Previously he was chief metallurgist, American Hoist & Derrick Co., St. Paul, which he joined in 1938 following graduation from University of Minnesota.

♦ ♦ ♦

Emil J. Romans has been appointed assistant foundry superintendent in charge of operations, National Malleable & Steel Castings Co., Cleveland. Mr. Romans will supervise the core department, foundry labor and sand systems. **R. G. Seidel** has been made assistant foundry superintendent in charge of mechanical equipment including patterns. **Louis Champa** has been named core room superintendent, assisted by **Stephen Emrick**, in charge of operations, and **Joseph Kuchler** in charge of schedules. **Joseph Fattlar** and **George Nestor** have been made sand technicians.

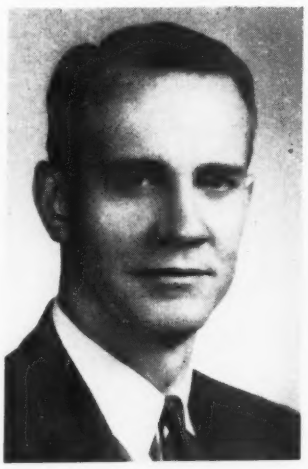
♦ ♦ ♦

John T. Walmsley has been appointed midwest area salesman, Hooker Electrochemical Co., Niagara Falls, N. Y., with headquarters in Chicago. Mr. Walmsley, with the company since 1950, was assistant sales engineer in Tacoma, Wash., and for the past year has been in the Niagara Falls sales office. **Frederick W. Bonacker Jr.** and **Gregory J. Perreault** have been appointed technical correspondents in the Niagara Falls sales office technical service department.

♦ ♦ ♦

James A. Parsons Jr. has been appointed professor of metallurgy, Tennessee Agricultural and Industrial State University, Nashville, Tenn., where he will co-ordinate chemical, metallurgical and foundry engineering. Mr. Parsons has been manager

(Continued on page 124)



R. V. RIGHTER
. . . Danville plant, GMC

L. F. CORP
. . . Saginaw plant, GMC

JESSE J. BAUM
. . . A. C. P. supervisor

F. J. McDONALD
. . . supt., Saginaw plant

protect your profits with APEX ... Z-50 ALUMINUM ALLOY

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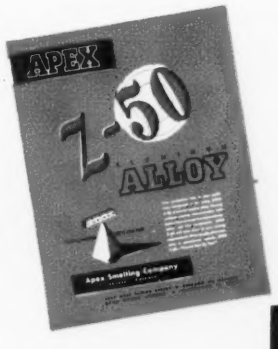
QUALITY AND ECONOMY
tested and proved on the job

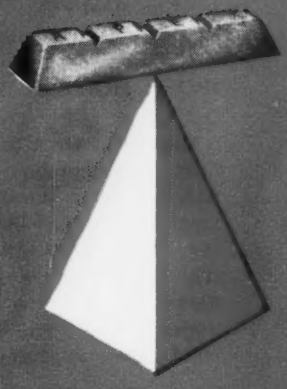
Above average mechanical properties, uniform casting characteristics and free machinability make Z-50 aluminum alloy developed by Apex an outstanding money saver on your production line.

Fulfilling the foundry's need for a quality all-purpose alloy, Apex Z-50 polishes and buffs to a satin finish, has excellent response to anodizing and other chemical and electrochemical finishes. Its as-cast properties are right for most castings, it may be treated for highly stressed castings, and it provides superior dimensional stability with an aging treatment.

Apex Z-50 is another superior product of Apex research and scientifically controlled production, tested and proved in the foundry field and in final application.



Send for your copy of Apex Z-50 folder showing composition, physical properties, and permanent mold and sand cast mechanical properties.



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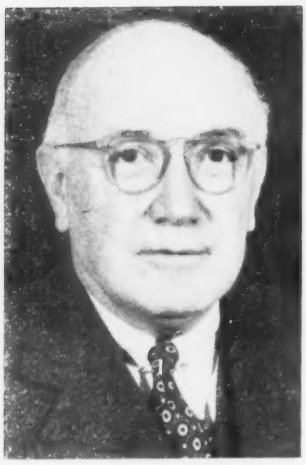
ROBERT E. BERRY
. . . joins GIFS

S. C. MASSARI
. . . joins Hansell-Elcock



CLARENCE TOLAN
. . . chairman, Dodge Steel

CHESTER S. ROBERTS
. . . Dodge Steel president

(*Continued from page* 122)

of the laboratory, Duriron Inc., Dayton, O., which he joined following graduation from Rensselaer Polytechnic Institute in 1922.

♦ ♦ ♦

Robert E. Berry, Wellake, O., has joined the staff of Gray Iron Founders' Society, Cleveland, as assistant to the executive vice president. Mr. Berry was graduated from Kent State University in 1950. He served in the Navy during World War II.

♦ ♦ ♦

Louis W. Adams Jr. has been named technical sales representative for the Pig Iron Division, Pittsburgh Coke & Chemical Co., Pittsburgh. Mr. Adams was graduated from Yale University and joined the company in 1947.

♦ ♦ ♦

Robert L. Orth has been appointed field sales manager in the home office, American Wheelabrator & Equipment Corp., Mishawaka, Ind., following 14 years as district manager in the Detroit sales office. **Julius E. Skene** has become manager of customer service, and **Philip R. Jordan,** chief sales engineer. In the Detroit office **Gordon R. Bryant** has been named district manager, **John W. Swantz,** district sales engineer, and **Erwin C. Shepard,** service engineer. In Chicago **F. H. Toman** has succeeded Mr. Swantz as district sales engineer. **J. Douglas Lamb** has taken over Mr. Toman's former duties as district service engineer, Toronto. **Wilfred G. Carrie** has become Seattle district manager. He was formerly home office project engineer in the Dust & Fume Control Division. **George C. Tolton** has been named district manager in Greensboro, N. C.

♦ ♦ ♦

S. C. Massari, since 1916 technical director, American Foundrymen's Society, has resigned to become manager of the Foundry Division, Hansell-Elcock Co., Chicago. Mr. Massari was graduated from Massachusetts Institute of Technology in 1924 and a year later became director of research, Illinois Zinc Co., Peru, Ill. In 1926 he was appointed chief metallurgist, Association of Manufacturers of Chilled Car Wheels, Chicago. He entered the Army in 1942 as a captain and was placed in charge of armor production and facility expansion for the Chicago Ordnance District, receiving commendation for outstanding service during that period. For a number of years before joining the staff of the AFS Mr. Massari was active in its technical affairs and served on numerous national technical committees, aiding in preparation of the cast metals, alloy cast irons and cupola operation handbooks published by the society. In 1949 he was recipient of the Whiting Gold Medal of the AFS for outstanding contributions in the field of ferrous metallurgy, molding and foundry practice and wartime service to the foundry industry.

♦ ♦ ♦

Clarence Tolan, since 1937 president, Dodge Steel Co., Philadelphia, has become chairman of the board. **Chester S. Roberts,** who joined the company in 1921 as secretary, treasurer and vice president, has been named president. Mr. Tolan was associated with American Steel Foundries from 1908 until 1922 when he joined Dodge Steel as vice president. He was a director of Steel Founders' Society of America for 3 terms and was a member of the Steel

(*Continued on page* 126)

LOUIS W. ADAMS JR.
. . . pig iron sales

ROBERT L. ORTH
. Wheelabrator, Mishawaka

WILFRED G. CARRIE
. . . Wheelabrator, Seattle

GORDON R. BRYANT
. . . Wheelabrator, Detroit

STEEL FOUNDRYMEN ONLY— are you troubled with FLOATING ALUMINUM?

Aluminum is outstanding as a deoxidizer for steel. However, it has one big disadvantage — it floats! Trying to deoxidize a full ladle of metal with shot or notch bar is tough — efficiency is down. But with USCO Aluminum deoxidization Stars you turn the disadvantage to an advantage. Cast as a six-pointed Star with a tapered hole through the center, it can be wedged on a steel rod and pushed to the bottom of the ladle. As the aluminum melts, it floats up through the steel and deoxidizes as it rises.

Say good-bye to inclusions and low efficiency — USE USCO STARS*

Stars come in both a 2 lb. and 5 lb. size. Our metallurgists are available for a demonstration of the use of Stars in your plant.

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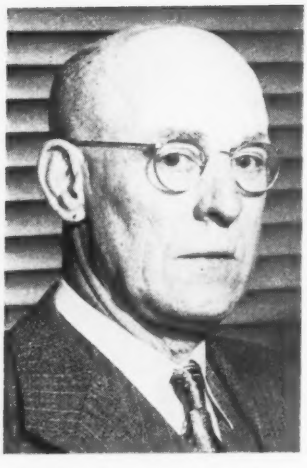

CHARLES H. EVANS, elected vice president, Rosedale Foundry & Machine Co., Pittsburgh, as reported in June

PAUL H. MAGNUS II, vice president, Rosedale Foundry & Machine Co., Pittsburgh, as reported in June

(*Continued from page* 124)

Casting Advisory Committees to NRA and OPS. Mr. Roberts was with Link-Belt Co., Chicago, for a year prior to joining Dodge Steel and has been active in committee work of the Steel Founders' Society.

♦ ♦ ♦

Kurt F. Wendt, professor of mechanics, has been named dean of the college of engineering, University of Wisconsin, succeeding **Dean Morton O. Withey,** who has retired. Mr. Wendt joined the Wisconsin university faculty following graduation from the college of engineering in 1927 and since 1935 has been in charge of the materials testing laboratory.

♦ ♦ ♦

George W. Anselman has resigned as vice president and general foundry superintendent, Beloit Foundry Co., Beloit, Wis., to establish a consulting service, Box 203, Rockton, Ill. In addition to acting as consultant for Gerwin Industries, Michigan City, Ind., Mr. Anselman will offer consultant service to the foundry industry. Prior to joining Beloit Foundry in 1950, he was associated with Woodruff & Edwards Inc., Elgin, Ill., Ayers Mineral Co., Zanesville, O. and Goebig Mineral Supply Co., Chicago.

♦ ♦ ♦

William A. McCarthy has been appointed sales representative by Tracerlab Inc., Boston, in the office recently opened at 4614 Prospect Ave., Cleveland. He was formerly in the Chicago sales division. **John H. Klinger,** for 3 years at the company's laboratory in Berkeley, Calif., has been made Los Angeles sales representative. **L. Keith Elrod** has joined the company as southeastern sales representative, with headquarters in East Point, Ga. **William F. Butler** has been named Washington district manager.

♦ ♦ ♦

Albert F. Pfeiffer, pattern and foundry division, Allis-Chalmers Mfg. Co., Milwaukee, has been elected president of the Wisconsin Chapter of the American Foundrymen's Society for 1953-54. Mr. Pfeiffer joined the Scranton, Ill., plant of Allis-Chalmers in 1906 and 5 years later was transferred to West Allis, Wis. His experience in the pattern division there has fitted him for active and advisory participation in work with the AFS Pattern Division, as chairman in 1947 and currently as executive committeeman.

♦ ♦ ♦

Lee C. Wilson, Reading, Pa., recently joined Lester B. Knight & Associates, and will work with both the New York and Chicago offices. Following graduation from Yale University, Mr. Wilson was associated successively in executive positions with Harbison-Walker Refractories Co., Pittsburgh, Chain Belt Co., Milwaukee, Federal Malleable Co., West Allis, Wis., Interstate Iron & Steel Co., Chicago, and American Chain & Cable Co., Reading, Pa. In 1946 he established an engineering sales agency to serve the foundry and metalworking industries and he still does limited work for Ross-Meehan Foundries, Chattanooga, Tenn. In 1948 he became consultant for the National Security Resources Board, Washington, and since 1950 he has been manager of the Reading, Pa., branch of Bearings Inc., Philadelphia. Mr. Wilson received the Frederick A. Lorenz Gold Medal in 1940 from Steel Founders' Society of America. He served as national president, 1943-44, of the AFS.

♦ ♦ ♦

Freel F. Bryan has been named vice president-sales manager, Acme Steel & Malleable Iron Works Division of Buffalo Brake Beam Co., Buffalo.

♦ ♦ ♦

J. A. Hill has been named vice president-sales manager, Thor Power Tool Co., Aurora, Ill. He has been with the company 33 years. **B. H. Johns,** for 27 years in the St. Louis

(*Concluded on page* 128)

GEORGE W. ANSELMAN
. . . foundry consultant

ALBERT F. PFEIFFER
. . . Wisconsin chairman

LEE C. WILSON
. . . joins Lester B. Knight

J. A. HILL
. . . Thor Tool executive

50 TONS of Stainless Steel a Day...

Melted in this AJAX-NORTHRUP INDUCTION FURNACE

Every 1¾ hours, one of these Ajax-Northrup furnaces pours 10,000 pounds of top-quality stainless steel. Total capacity is well over 50 tons a day!

Composition is uniformly exact. Alloying elements are controlled within a fraction of a per cent in every melt. Carbon is consistently kept below 0.05%.

Losses of expensive elements are negligible. Operating costs have been low enough to pay for the furnaces in just a few years!

This installation is typical of the growing use of induction melting for larger and larger jobs. In some of these, induction melting is the only way the job can be done. In others, it does the job better, faster, and at lower cost than any other melting method.

No matter what the job . . . or the quantity . . . Ajax-Northrup's 36 years of induction experience can help you. Just write or call us.

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INDUCTION HEATING AND MELTING

Since 1916

148

(Concluded from page 126)

and Philadelphia branch offices, and later sales manager of the contracting and mining division, has become vice president in charge of rock drill sales.

♦ ♦ ♦

Ernest Bissonnette has been appointed plant superintendent, and **Charles E. Gouin,** assistant to the works manager, Joliette Steel Division, of Dominion Brake Shoe Co., Joliette, Quebec. Mr. Bissonnette started in 1928 as a helper molder, became time keeper, foundry clerk and foreman. Mr. Gouin, who succeeds Mr. Bissonnette as assistant to the work manager, is a graduate of McGill University. He joined the division last year following several years experience with Canadian Refractories Ltd. and Canadian Car & Foundry Co. Ltd., Montreal.

♦ ♦ ♦

Randolph J. Roshirt was elected vice president, Aluminum Industries Inc., Cincinnati, in charge of integrating production and sales operations, and new product development. Mr. Roshirt was previously associated with Bohn Aluminum & Brass Corp., Detroit for 34 years, where he was executive vice president and director.

♦ ♦ ♦

A. C. Reppenhagen, general manager, Mid-West Abrasive Co., Owosso, Mich., has been elected president. **L. P. Jackson** continues as chairman of the board. Mr. Reppenhagen, a graduate of University of Detroit, was general manager, Experimental Tool & Die Co., prior to joining the company in 1944.

♦ ♦ ♦

Gordon E. Medlock, formerly assistant sales manager, has been appointed sales manager, Stearns Magnetic Inc., Milwaukee, where he will direct sales of the company's line of magnetic separation and power transmission equipment. He joined the company in 1946.

♦ ♦ ♦

Robert M. Love has been appointed Pittsburgh district editor of FOUNDRY and other Penton publications, succeeding Robert E. Hall, who has left the company. Mr. Love was graduated from Oberlin College and also attended University of Wisconsin. After several years as a reporter on the Youngstown Vindicator and Cleveland Plain Dealer, he joined STEEL in 1952 where he specialized in market, news and technical reporting.

ROBERT M. LOVE
. . . *FOUNDRY, Pittsburgh*

♦ ♦ ♦

Harry T. Graham and **Herbert F. Greene** have been named vice presidents, General Refractories Co., Philadelphia. **Richard E. Longacre** has succeeded **Mr. Graham** as general sales manager. Mr. Graham, who will continue in supervision of the sales group, joined the company's sales staff in 1937, became assistant district sales manager in Pittsburgh and later assistant general sales manager of the company. Mr. Greene attended Lehigh University and Washington and Jefferson University and has been active in company production work for 25 years.

♦ ♦ ♦

Ralph R. Newquist has been appointed president-general manager, Roots-Connersville Blower Division, Dresser Industries Inc., Dallas, Tex., succeeding **R. H. Owens** who has become chairman until his retirement later this year. Mr. Newquist, a graduate of Pennsylvania State College, joined the company in 1946 as vice president-sales. Since 1951 he has been executive vice president. Before joining Roots-Connersville, he was Washington manager, Allis-Chalmers Mfg. Co., Milwaukee.

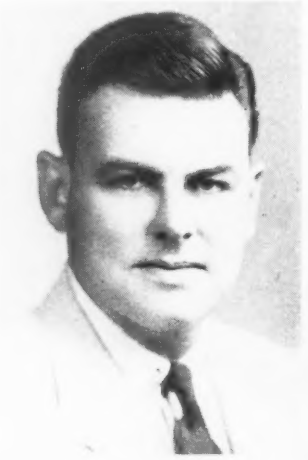
♦ ♦ ♦

John V. Moran Jr. has been appointed section head of the special publications section, International Nickel Co., New York, succeeding the late Edward C. Badeau. Mr. Moran is editor of *Pen* and *Inco*, employee publications, and has been Mr. Badeau's assistant for 2 years.

♦ ♦ ♦

John A. Rassenfoss, 1953-54 president of the Chicago Chapter of the AFS, is assistant research director, American Steel Foundries, East Chicago, Ind. Although a native of Miami, Okla., he spent most of his earlier years in Kentucky. Attending the University of Kentucky, he graduated with a B.S. in metallurgical engineering in 1940, and in 1941 was awarded the M.S. degree. Upon completion of these studies, Mr. Rassenfoss joined the American Steel Foundries research laboratory organization, where he has since been engaged in development work pertaining to foundry practice. Active in AFS affairs, he has been a member of several national committees.

GORDON E. MEDLOCK
. . . *Stearns Magnetic sales*



HARRY T. GRAHAM
. . . *refractories vice pres.*

RALPH R. NEWQUIST
heads Roots-Connersville

JOHN A. RASSENFOSS
. . . *heads Chicago Chapter*

Republic, the only producer of a complete line of merchant pig irons, offers you a field metallurgical service staffed by a group of highly skilled Pig Iron Metallurgists.

The job of the Republic Pig Iron Metallurgist is to help you solve foundry problems or to furnish answers to questions on molding practice. Frequently he is called in to make a routine foundry survey. His recommendations and suggestions often result in improved plant operation, increased production efficiency and unit output with no increase in overhead costs.

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REPUBLIC STEEL

CHARLES A. GUTENKUNST JR.
Charles H. McCrea Award Winner

GEORGE T. BOLI
President

CHARLES E. BRUST
Vice President

MALLEABLE FOUNDERS' SOCIETY

Holds Annual Meeting

By FRANK G. STEINEBACH
Editor

REPORTS on recently completed research projects, consideration of further studies, reports of committee activities, and discussions of industry and world problems featured the annual meeting of the Malleable Founders' Society held at the Homestead, Hot Springs, Va., June 8-9.

George T. Boli, president, Northern Malleable Iron Co., St. Paul, was elected president and Charles E. Brust, president, Eastern Malleable Iron Co., Naugatuck, Conn., was elected vice president of the society for the coming year. Three new directors elected are: Don L. Boyes, Central Foundry Division, General Motors Corp., Saginaw, Mich.; Charles M. Brennan Jr., New Haven Malleable Iron Co., New Haven, Conn.; and C. L. Liebau, Federal Malleable Co., West Allis, Wis.

The 1953 Charles H. McCrea Award for outstanding service to the malleable castings industry was presented to Charles A. Gutenkunst Jr., president, Milwaukee Malleable & Gray Iron Works, Milwaukee. In presenting the award, Mr. Brust pointed to the many services which Mr. Gutenkunst has rendered the society and the industry. He served two terms as president from 1942 to 1944 and several terms on the board of directors; has been chairman of many important society committees, including the Research and Product Improvement Committee, and at present is a member of the Finance Committee.

Mr. Gutenkunst was commended particularly for his outstanding service to the industry during World War II and the Korean emergency. As a member of the industry's advisory committee to the Office of Price Stabilization, he was active in the preparation of CPR 60, the order which controlled prices, and in counselling with government officials in the preparation of amendments to that order. He also is a member of the industry's advisory committee to the National Production Authority.

Committee reports were presented at the opening session, with Frank D. Brisse, Laconia Malleable Iron Co., Laconia, N. H., and president of the society, presiding. John A. Wagner, Wagner Malleable Iron Co., Decatur, Ill., reporting for the Cost Accounting Committee, stated that 23 accounting meetings had been held during the year under the committee's sponsorship. As an aid to plant managers and accountants, the committee has developed an index for relating the value of equipment to the present dollar level for computing depreciation rates in cost finding. This index was presented to the industry at sectional meetings and has been issued as a bulletin to supplement the cost manual.

T. A. Scanlan Jr., Eastern Malleable Iron Co., reported that the Market Development Committee sponsored the successful Fourth Annual Market Development Conference (FOUNDRY for June, page 178); has continued to push the showing of the picture "This Moving World," and has received approval of the board of directors to undertake a program of co-operative industry advertising in business papers. Mr. Scanlon stated that the distribution of the handbook has been most successful, 2700 copies going to 33 engineering schools. Consideration is being given to extending this work to other fields. Revision of the handbook for a new edition has been recommended by the committee.

(Continued on page 132)

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to volume sales in
a five billion dollar market

Foundry's PLUS 5 SERVICE

helps you keep ahead of competition

What is PLUS 5? It's your key to more business from foundries. It gives every FOUNDRY advertiser a bonus he can get from no other source. Here is help in analyzing this market—studying sales territories and potentials—planning the sales effort—and creating a constructive promotion program to the 5 billion dollar foundry market. It's time to take a new look at this market—and at the unusual selling aids we have for you. Say PLUS 5 to your FOUNDRY representative and he'll show you this 5-step program designed to move more of your products into foundries.

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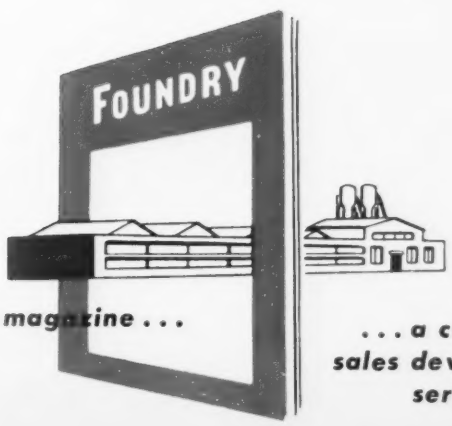


More than a magazine . . .

. . . a complete sales development service

Vice President-elect Charles E. Brust, left, presents the 1953 Charles H. McCrea Award for outstanding service to the malleable castings industry to Charles A. Gutenkunst, who has served twice as president of the society

(*Continued from page* 130)

C. M. Lewis, Badger Malleable & Mfg. Co., South Milwaukee, Wis., reported that the Government Affairs Committee continued on a stand-by basis during the year. At the same time Mr. Lewis criticized industry for failure to make known its position to Washington. He urged that members of the society tell Washington officials of the problems facing the producers of castings.

Roy N. Hoffman, Michigan Malleable Iron Co., Detroit, reported that the Membership Committee has a more active program under consideration for the coming year. Lowell D. Ryan, managing director of the society, presented a report for the Personnel and Plant Operations Committee. He stated that the Personnel Conference held in Cleveland was well attended and that sectional meetings were devoted to "attracting and utilizing technical personnel." The committee undertook two surveys, during the year, one dealing with foremen's compensation and the other with personnel practices.

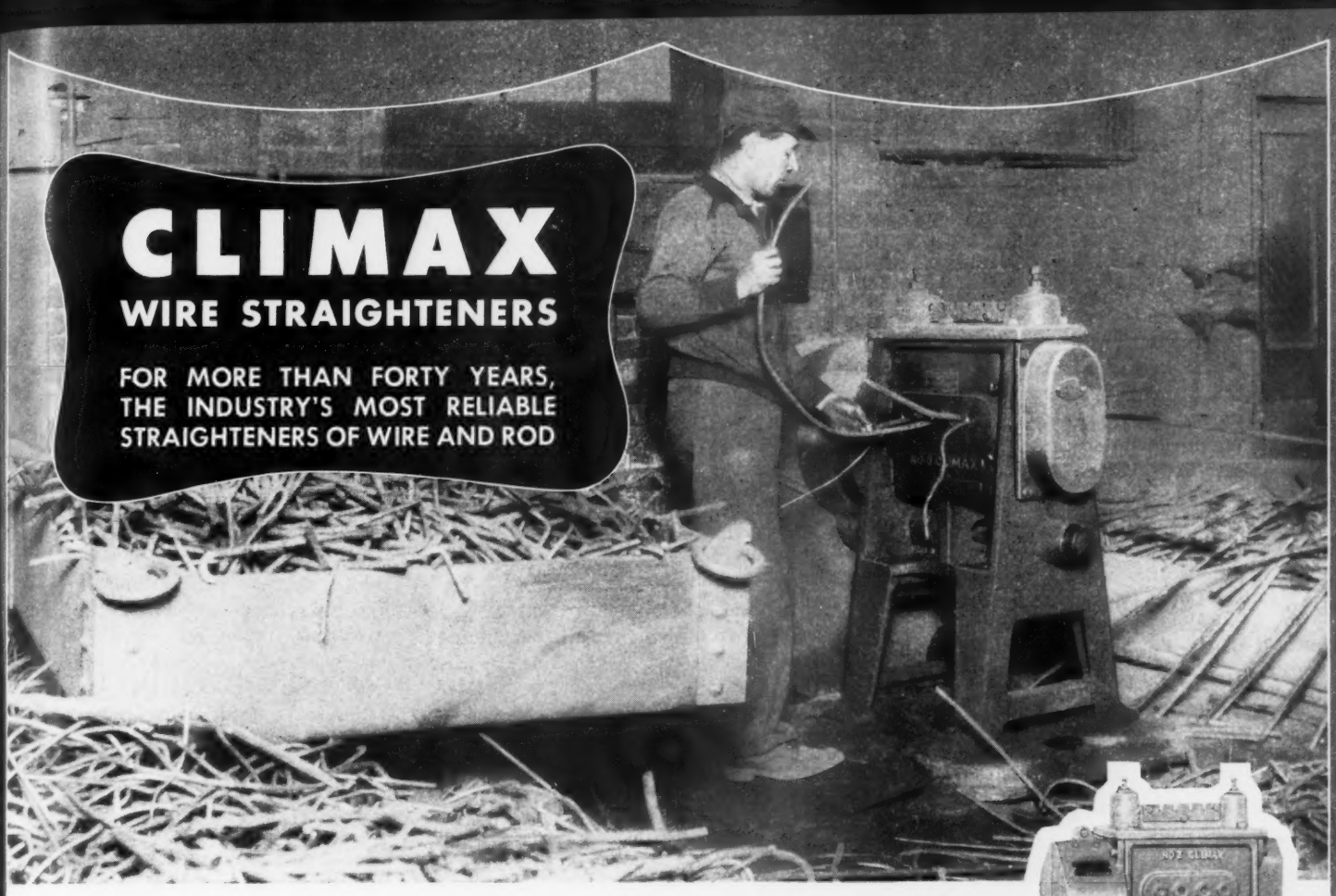
C. L. Liebau, Federal Malleable Co., West Allis, Wis., reported that the Educational Committee has published a booklet designed to attract the interest of the engineer to the malleable industry, and this is being distributed. Mr. Liebau urged that members assist in the distribution of the booklet. He also stated that the work of improving textbook material on malleable castings is being continued as a long range program. Wilson H. Moriarty, National Malleable & Steel Castings Co., Cleveland, reported that the financial affairs of the society are in good condition.

George J. Behrendt, Eastern Malleable Iron Co., Naugatuck, Conn., reported that the Research and Product Improvement Committee has completed the "Core Materials and Practices" research project and is continuing phase two of "Gating and Feeding." The study on core materials and practices was made by Earl Woodliff, Foundry Sand Service Engineering Co., Detroit, and the work on gating and feeding is being done at Cornell University under the supervision of Professors Kyle, Thorpe and Joyce. Mr. Behrendt stated that the following subjects, if possible, will be studied through separate investigations at a number of society plants:

Pouring temperature; pouring rate; gate size, shape and location; feeder shape. These studies will be used in connection with continuation of the project at Cornell. During the coming year the work at the university will include co-ordination of all phases of the project, conclusion of the work on maximum feeding distance of uniform section, completion of the work on maximum feeding distance of tapered sections, investigation of the effect of tapered sections on the possible displacement of curve applying to sections of uniform thickness, and testing the validity of experimental data through continued

(*Continued on page* 134)

President Frank D. Brisse addresses the annual dinner. From left to right at the speakers table are Mrs. Frank D. Brisse; Charles A. Gutenkunst; Mrs. George T. Boli; Mr. Brisse; Mrs. Charles E. Brust; President-elect George T. Boli; Mrs. Charles A. Gutenkunst; and Vice-President-elect Charles E. Brust



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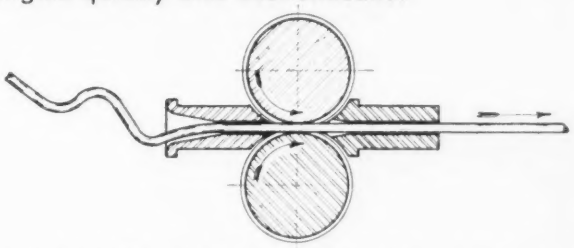
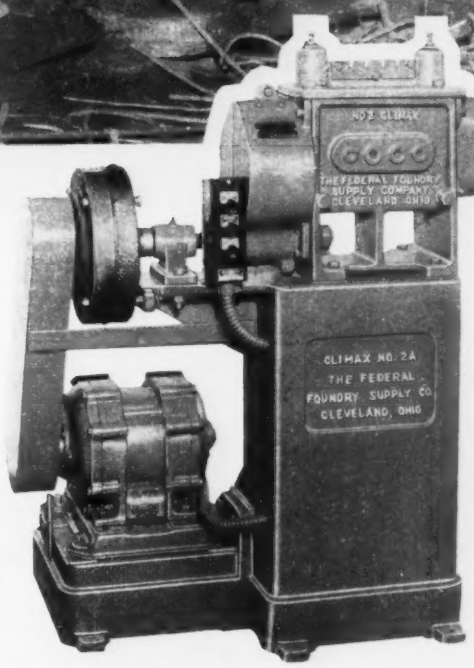
FOR MORE THAN FORTY YEARS, THE INDUSTRY'S MOST RELIABLE STRAIGHTENERS OF WIRE AND ROD

Reclaim your used core rods and wires and save money—with the CLIMAX. Operated safely and efficiently by unskilled labor. Straightens random lengths quickly and economically.



Bent wire is first checked in guide slots at top of the machine to determine proper feed hole, then inserted in feed hole, straightened between two heavy, alloy steel rolls under spring tension and ejected at back with a slight, natural bend, just right for core rod use.

Safety for the operator, as well as long life for the machine, is insured by enclosing gears and other moving parts. On motorized units, V-belts are enclosed and electrical wiring protected. Conveniently mounted controls and a reversible magnetic switch provide full protection for operator and straightening rolls, by enabling operator to stop or reverse machine instantly.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CLIMAX NO. 2A
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Handles 4 wire sizes, 1/16" to 1/4". A complete unit, ready for operation when connected to current supply.

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The CLIMAX is offered in three sizes: to handle 4 wire sizes from 1/16" to 1/4"—4 sizes from 3/16" to 1/2"—and 5 sizes from 1/4" to 3/4". Each size may be furnished in three styles, as follows:

(1) Completely motorized—ready to operate.
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(*Continued from page* 132)

studies.

W. A. Kennedy, Grinnell Co., Providence, R. I., reporting for the Technical Council, stated that the work on core materials and practices and part two of gating and feeding project were available for distribution at the meeting. Work is being done by the council on other projects, including studies of nodular iron, noise control, machinability, testing procedures, shell molding, pressure molding and sand control. Mr. Kennedy also reported on the relationships of the various members of the council with other organizations interested in the malleable field, including the American Foundrymen's Society, the American Society for Testing Materials, the Society of Mechanical Engineers and the Society of Automotive Engineers.

Prof. Peter E. Kyle, Cornell University, reported on part two of the gating and feeding project which deals with "Solid Castings Fed by Single Side Blind Feeder." Professor Kyle outlined the project and methods of procedure, and then presented a curve establishing a volume solidification ratio relation for solid castings fed by a single blind side feeder. He then reported on several checks that had been made which indicate that the curve functions satisfactorily, and asked that members of the industry conduct studies to check further the utility of the curve.

Earl E. Woodliff stated that part one of the core materials and practices study dealt with tests of representative core mixtures and pertinent data. This phase of the research provided for the collection of information on the industry's practice and this data could be obtained only by pooled information. Part two of the report has 16 separate studies and many sub-studies, making over 40 separate investigations. Studies were made to establish as many relationships as possible between combinations of binders.

A wide range of data has been developed from this study which should be of great practical value to the operator in the core department. For example, it was found that core oil with poor bakability exerted detrimental effects on green properties and resulted in the use of extra cereal binders and resultant gas formation. A little clay in the sand reduces somewhat the amount of cereal binder required. While some advantage may be gained in the order of addition, the principal advantage is based upon the fact that the greater the time the cereal and oil are intermixed, the better the core properties. To assure core control, all materials should be weighed and a close check should be kept upon grain distribution, especially the control of fines and clay content.

James H. Lansing, technical and research director of the society, reported on further work being done in the field of testing. He told of contacts with engineering schools and outlined some of the work of the society laboratory in Cleveland.

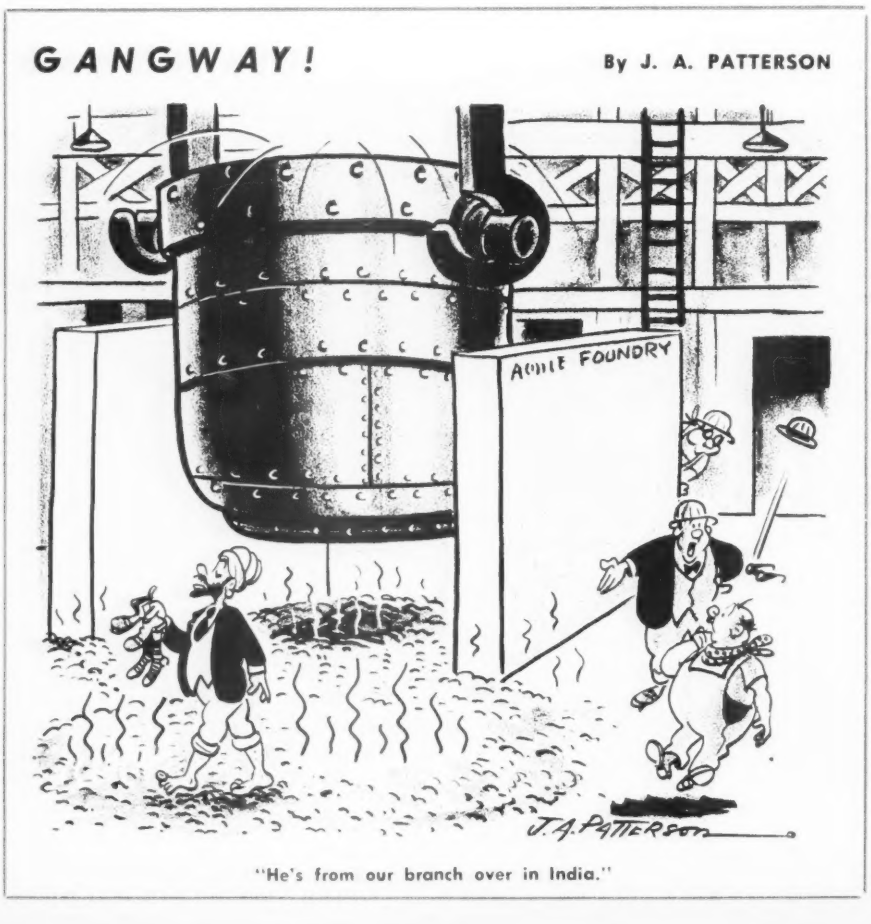
Rev. W. T. Hogan, Fordham University, New York, presented an interesting discussion on "The Economics of Productivity." Productivity is the relationship between the factors that go into production (raw material, manpower and machinery) and the ultimate product. The nation secures a definite increase in real wealth if productivity increases. While reference frequently is made to labor productivity, determination of industrial productivity should include consideration of the effects of raw materials and machinery as well as labor in ascertaining total gain.

Discusses Industrial Indexes

Since many labor contracts are tied to an increase in productivity, the speaker outlined how index numbers are arrived at. These are roughly on three levels, namely national, industry or individual plant. Since all industries are not uniform, it is difficult to translate the productivity into dollars. Because there is no reason why each industry should increase productivity in the same amount, the speaker questioned the accuracy of that type of index. Providing an industrial index also produces a weighing problem and becomes quite complex. Therefore, it is felt that the individual plant basis is the only sound method of determining an index which can be utilized accurately.

Productivity may be increased by beneficiating the raw materials to the fullest extent, procuring the latest machinery within the limits of the financial position of the company, and getting the best work out of the manpower. To accomplish the latter, it is necessary to give the man an additional incentive. Father Hogan suggested that this should provide a good flat base pay and an additional incentive. The incentive should be presented in a way that the ordinary workman can understand and see what he is getting. The incentive should be constructed so that the worker will get as much

(*Concluded on page* 137)



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EMULSIFIED OIL

Fast Baking

If cows came first, then the principle around which Aqua-bond was built is older than the foundry industry. Like milk, it's an emulsion . . . and, like your favorite brand of milk, it's homogenized. Why do foundries need it? Because

It won't migrate • It bonds faster • Builds even strength
Keeps cores open • Clears gas faster
Crumbles quicker • Shakes out cleaner • Keeps gas lower

Regular core oils are thinned with oven heat and tend to settle, leaving cores more dense at the bottom. Water is not effected in this way and like water, an emulsion "stays put". Heat that breaks the emulsion will bond the sand fast. The oil left is spread so thinly on each sand grain that it takes a quick set before it can migrate. In this thinly spread condition, it builds cross-sectional strength in the core and, because bonding takes place while steam is being driven out of the core, it seals open these passageways so that gas, on pouring, can find its way out faster and heat can take a deeper bite into the core to burn out the bond. This cleaner burnout means cleaner castings and then too, the gas problem disappears because, pound for pound, there is less gas-forming material in an emulsion.

That is why Aqua-bond has cured many cases of hot cracks where metal is thinly laid against a heavier type of core.

And now, for the first time, you can get an emulsified oil in the really new fast baking class. Aqua-bond FB 39 is a new brand for a brand new binder. High strength and fast oven action will commend it to you as an aid for your finest class of work.

Try this prescription yourself; it really works; or write us for more data.

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THE RIGHT CHOICE

No one type of flask can do every job efficiently. These two lines of flasks were designed for maximum performance in their type of duty. Let an Industrial representative help you make the *right choice* for your requirements.

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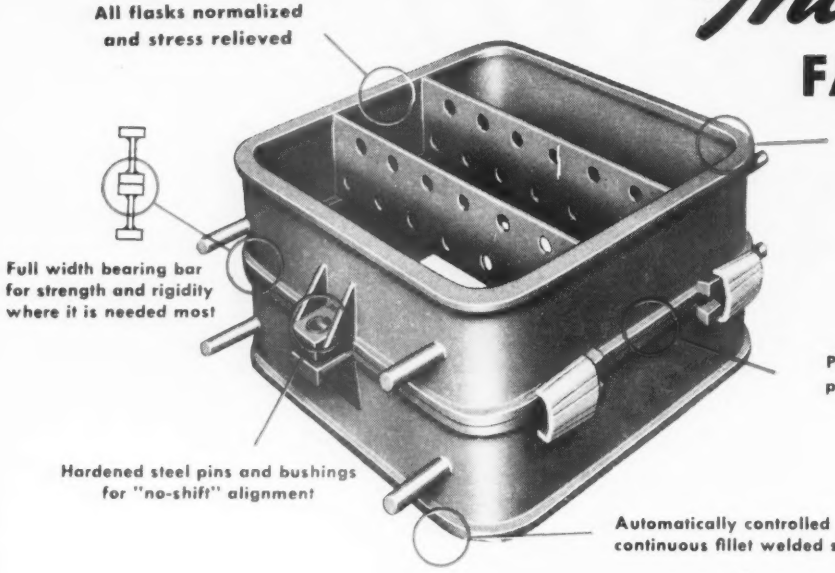
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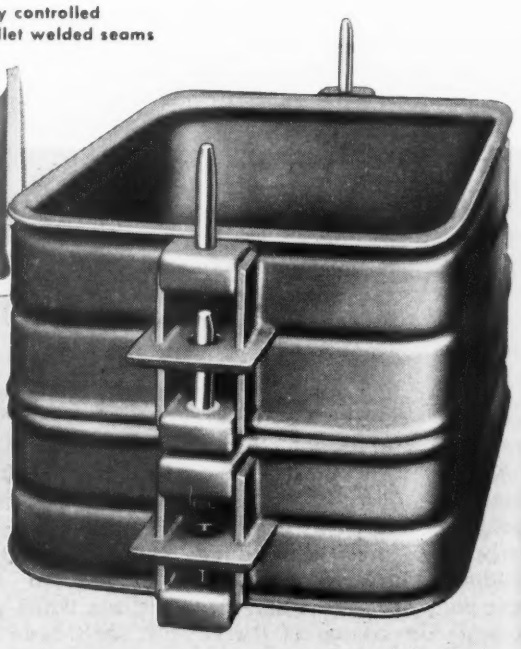

Pressed steel flasks engineered for accuracy, durability and economical service.

Favorable delivery on both types of flasks.

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(*Concluded from page 134*)

out of the machine as possible. This poses a problem. While at the moment we need production, a slacking off period will bring dislocations. Does that mean that there should be a slowing down on the rate of productivity increase?

President-elect George T. Boli outlined the highlights of the contemplated program for the coming year. He urged support and participation in the cost groups, stressed the importance of paying greater attention to safety, announced a personnel conference for October and expressed gratification on the excellent response to the research program. He stated that the shop practice meetings will be continued, that a committee is studying the need for revisions on the handbook, that a market development conference will be held in Pittsburgh, Apr. 8-9, 1954, and that a series of regional Engineering Sales conferences will be organized with the following dates:

New York, Nov. 5; Chicago, Nov. 11; Chicago, Feb. 25; New York, Mar. 4. Mr. Boli stated that the theme of his administration would be "promotion—and still more promotion." The industry has an excellent product in which it can take great pride, but further steps must be taken to disseminate more information on the availability of malleable iron for a wide variety of industrial uses.

Lowell D. Ryan, managing director, praised the great sharing of know-how in the various co-operative ventures of the society. He spoke of the research work, the market development conference and the exchange of sales information, and the work being done on other projects. He indicated that, in addition, the individual companies are doing a much better promotion job, are apparently conscious of the need of training salesmen, are advertising, and are moving toward greater marketing efforts.

James H. Smith, general manager, Central Foundry Division, General Motors Corp., Saginaw, Mich., reviewed his lecture, "Outstanding Opportunities for the Foundry Industry," which was given at the recent annual meeting of the American Foundrymen's Society in Chicago, and presented in full in this issue. Mr. Smith also showed the two films which had been prepared for that lecture.

Roscoe Drummond, Washington Bureau chief, *Christian Science Monitor,* Washington, outlined the situation in Washington and the world. In conclusion, he pointed to the fact that those who consider that this is possibly the worst time in the world's history to have lived might be wrong and that the present offers a glorious opportunity. In his opinion we need never fear the future if we are willing to face the present.

Meetings of Interest to Foundrymen

Aug. 10-19—Advanced Cast Metals Practice, University of Michigan, Ann Arbor, Mich.

Sept. 16-18 — National Foundry Association, annual meeting, Plaza Hotel, New York

Sept. 17-18—Niagara Frontier Regional Foundry Conference, sponsored by Western New York, Ontario, Northwestern Pennsylvania, Rochester, Central New York and Eastern New York Chapters of the AFS, Hotel Statler, Buffalo

Sept. 19-26 — International Committee of Foundry Technical Associations, annual foundry congress, Paris, France

Sept. 21-22—Steel Founders' Society, fall meeting, Homestead, Hot Springs, Va.

Sept. 21-25—Instrument Society of America, national congress and exhibit, Sherman Hotel, Chicago

Sept. 24-25 — Ohio Regional Foundry Conference, sponsored by University of Cincinnati and Ohio AFS Chapters, Netherland-Plaza Hotel, Cincinnati

Sept. 25—Malleable Founders' Society, general society meeting, Hotel Cleveland, Cleveland

Oct. 8-9—Gray Iron Founders' Society, annual meeting, New Hotel Jefferson, St. Louis

Oct. 8-9—Michigan Regional Foundry Conference, Kellogg Center, Michigan State College, East Lansing, Mich.

Oct. 15-17—Foundry Equipment Manuacturers' Association, annual meeting, Greenbrier, White Sulphur Springs, W. Va.

Oct. 16-17—Northwest Regional Foundry Conference, sponsored by Oregon, Washington and British Columbia Chapters, AFS, New Washington Hotel, Seattle

Oct. 17-20—Conveyor Equipment Manufacturers Association, annual meeting, Greenbrier, White Sulphur Springs, W. Va.

Oct. 19-23—National Safety Council, national safety congress and exposition, Chicago

Oct. 19-23—American Society for Metals, national metal congress and exposition, Public Auditorium, Cleveland

Oct. 29-30—Metal Castings Conference, sponsored by Purdue University, Michiana and Central Indiana AFS chapters, Purdue University, West Lafayette, Ind.

Nov. 4-6—Steel Founders' Society, T & O Conference, Carter Hotel, Cleveland

Nov. 4-6—Industrial Management Society, annual time and motion study and management clinic, Sheraton Hotel, Chicago

Nov. 5-6—Annual Pittsburgh Diffraction Conference, Mellon Institute, Pittsburgh

Dec. 3-5—American Institute of Mining & Metallurgical Engineers, electric furnace steel conference, Netherland-Plaza Hotel, Cincinnati

1954

Feb. 11-12—Wisconsin Regional Foundry Conference, Schroeder Hotel, Milwaukee

Feb. 18-19—Southeastern Regional Foundry Conference, Patten Hotel, Chattanooga, Tenn.

Mar. 15-19—National Association of Corrosion Engineers, tenth annual conference and exhibition, Kansas City

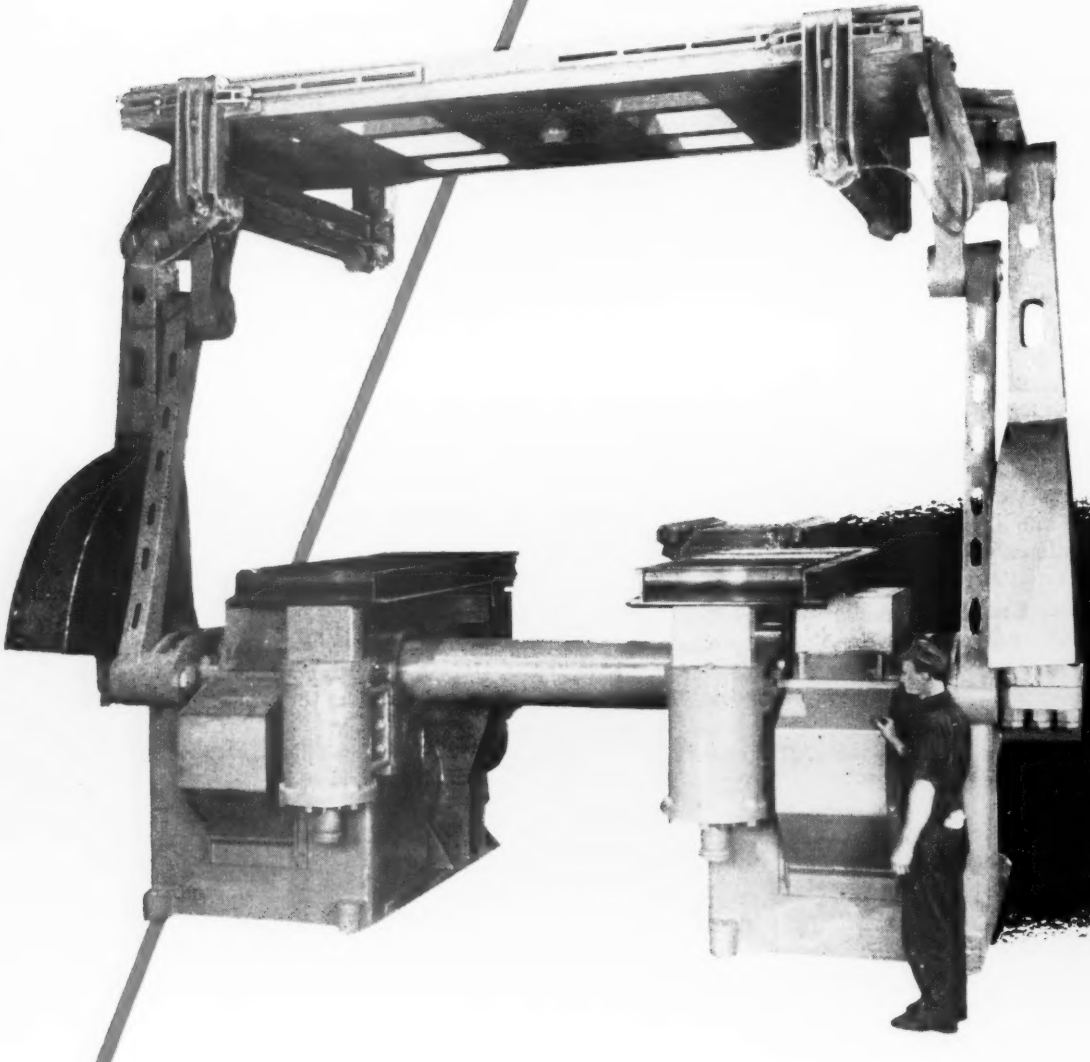
Mar. 16-17—Steel Founders' Society, annual meeting, Edgewater Beach Hotel, Chicago

Apr. 5-7—American Institute of Mining & Metallurgical Engineers, national open hearth conference, Palmer House, Chicago

Apr. 8-9—Malleable Founders' Society, market development conference, Pittsburgh

May 8-14—American Foundrymen's Society, annual convention and exhibition, Public Auditorium, Cleveland

NO. 8 OF A SERIES



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The quality engineering in this 20,000 lb. heavy-duty Rollover Draw Machine is another in our complete line of molding machines used by foundries everywhere for years and years.

It's popular because of its simple, single-valve control operation . . . any size mold or core clamped or unclamped instantly; automatic airlock outboard bearing draw device; pressure lubrication provided to each moving part. These, and many other features, enable it to respond to your heavy production schedules with outstanding performance records.

We will be pleased to recommend and tell you about the proper Herman molding machine for your operation.

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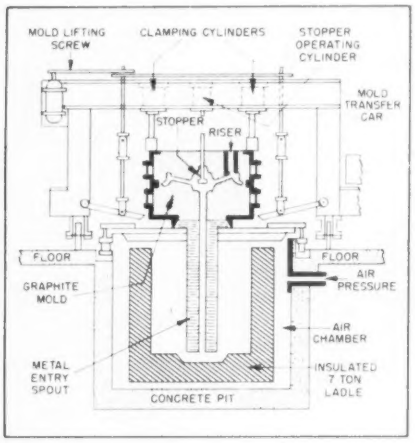
Herman MOLDING MACHINES

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH 22, PA.

Foundry Developments

By EDWIN BREMER

INGENIOUS method for production of cast steel carwheels for freight service has been developed by Griffin Wheel Co. As described in the April 6 issue of *Railway Age* a graphite mold in a steel frame is employed, and as shown in the accompanying sketch is mounted on a transfer car equipped with devices for lifting and clamping the mold. Transfer car with the mold is moved over a concrete pit containing a 7-ton capacity insulated ladle. After clamping down, the molten steel is forced upward from the ladle through a



vertical spout into the mold by air pressure admitted to the chamber surrounding the ladle. Metal is forced up at the rate of 1 lb per second until it reaches the mold, and then the rate is increased to 150 lb per second. Total pouring time to fill mold is about 4 seconds. Cope mold contains three 4-in. diam risers formed in phenolic resin shells. After steel solidifies, disintegrated shells allow risers to drop through the cope without damaging the mold. After the mold is filled the point of entry at the bottom of the hub is closed with a plunger-operated stopper, the mold is removed and replaced with another. When the wheel has solidified it is removed from the mold, the risers cut off, and the bore is made in the solid hub with an oxyacetylene torch.

* * *

ACCORDING to *Tin News*, published by Malayan Tin Bureau, Washington, the discovery that the tin content of aluminum-tin alloys can be increased from the present 6 per cent to 30 per cent or more means that an entirely new range of bearing alloys has become available by cold working and recrystallization heat treatment after casting. Properties of the matrix of the alloys can be modified further by addition of copper. New alloys have excellent fatigue properties, and are said to be softer than copper-lead alloys.

* * *

EXTENSIVE study of molding sand, including the correlation of several sand testing methods, leads one British investigator to the conclusion that the expressions "plasticity," "toughness" and "moldability" as applied to that material are synonymous with the more commonly used term "flowability."

* * *

INVESTIGATION of magnesium-aluminum alloy (Al 9.5, Zn 0.5, Mn 0.3 per cent) which occasionally showed small hexagonal voids in the center of many grains after solution treatment was conducted by E. Lardner and reported in the May issue of the *Journal* of the Institute of Metals (London). He found that the cavity formation increases to a maximum and then eventually vanishes with increasing homogenization. Also that the cavities are probably produced on cooling after solution treatment rather than during the progress of heat treatment.

* * *

ACCORDING to an article in the April 7 issue of *Australasian Engineer* subsurface pinholing in nodular cast iron poured into green sand molds appears to be connected to presence of "magnesium sulphide" slag, and to prevent its entry into the mold such techniques as thickening the slag after magnesium treatment, use of teapot spout pouring ladles and incorporation of suitable slag traps in the gating system are employed. An interesting departure from those is a process patented by Ford Motor Co. which claims that such cope defects can be controlled by fluxing the metal with any of the many fluxes developed for use with magnesium and having the property of wetting magnesium oxide at gray iron melting temperatures. Good results are said to be obtained with borax, fused borax and alkali metal fluoborates. Fluxing materials can be used in the mold itself, applied to the stream in pouring, or to the metal in the ladle. In the latter case the molten metal should be protected as far as possible from contact with the air or oxidizing mold gases after the flux treatment.

* * *

HELICOPTER made news in the foundry industry recently. A 14-year old chimney rising nearly 230 ft from the ground at the Waukegan, Ill., coke plant of the Chevrolet-Saginaw gray iron foundry division of General Motors Corp., was in need of repairs. There are no ladders or hooks on the chimney and it was calculated that it would take a crew about three weeks to work a scaffold up to the top. Cost of the scaffold would be about $10,000. The helicopter and a crew of two, supplied by Structural Waterproofing Corp., Chicago, placed a 24-in steel hook in the chimney mouth in a matter of minutes. Attached to the hook was some 200 ft of double-strand ½-in. manila rope which reached to the roof of the two-story plant below. This made it possible for workmen to attach a scaffold and pulley to the ropes and get to the top within an hour. The helicopter job cost less than $500.

* * *

METHOD to insure that slag does not come out with the first metal when electric furnace steel is tapped according to Norman T. Quigley, Puget Sound Naval Shipyard, is to open and clean out the taphole before tilting the furnace. Then a burlap sack is rammed into the hole, and the furnace tilted quickly so that the slag is well above the tap hole. Bag rapidly burns out permitting only molten steel to flow out of the taphole.

* * *

INVESTMENT-cast motor mount is being used to bear the entire weight and torque of a 100-lb, 15 hp aircraft starting motor according to Haynes Stellite Division. Cast from stainless steel, the bracket is one of the largest precision investment castings produced, and is being made for General Electric Co. Investment casting proved to be the most economical method of producing the motor mounts from stainless steel. Because of difficult and expensive finish-machining, a forging would have cost 2½ times as much. Parts require only four finishing operations to prepare them for installation.

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*Granite City, Ill.
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Verona, Pa.

Bucyrus-Erie Co.
So. Milwaukee, Wisc.

John Deere Co.
Waterloo, Iowa

Fahralloy Canada Ltd.
Orillia, Ontario

General Metals Corp.
Oakland, Calif.

General Motors Corp.
Cadillac Motor Car Div.
Central Foundry Div. • Defiance, Ohio
Fabricast Div. • Bedford, Inc.

International Harvester Co.
*Louisville, Ky.

Massey-Harris Co., Ltd.
Brantford, Ontario

McConway & Torley Corp.
Pitsburgh, Pa.

National Malleable & Steel Castings Co.
Sharon, Pa.

Pacific Car & Foundry Co.
Renton, Wash.

Symington-Gould Corp.
Depew, N. Y.

Union Steel Castings Co.
Pittsburgh, Pa.

United Engineering & Foundry Co.
New Castle, Pa.

U. S. Naval Shipyard
Pearl Harbor, H. I.

U. S. Naval Gun Factory
Washington, D. C.

Wehr Steel Co.
Milwaukee, Wis.

West Michigan Steel Foundry Co.
Muskegon, Mich.

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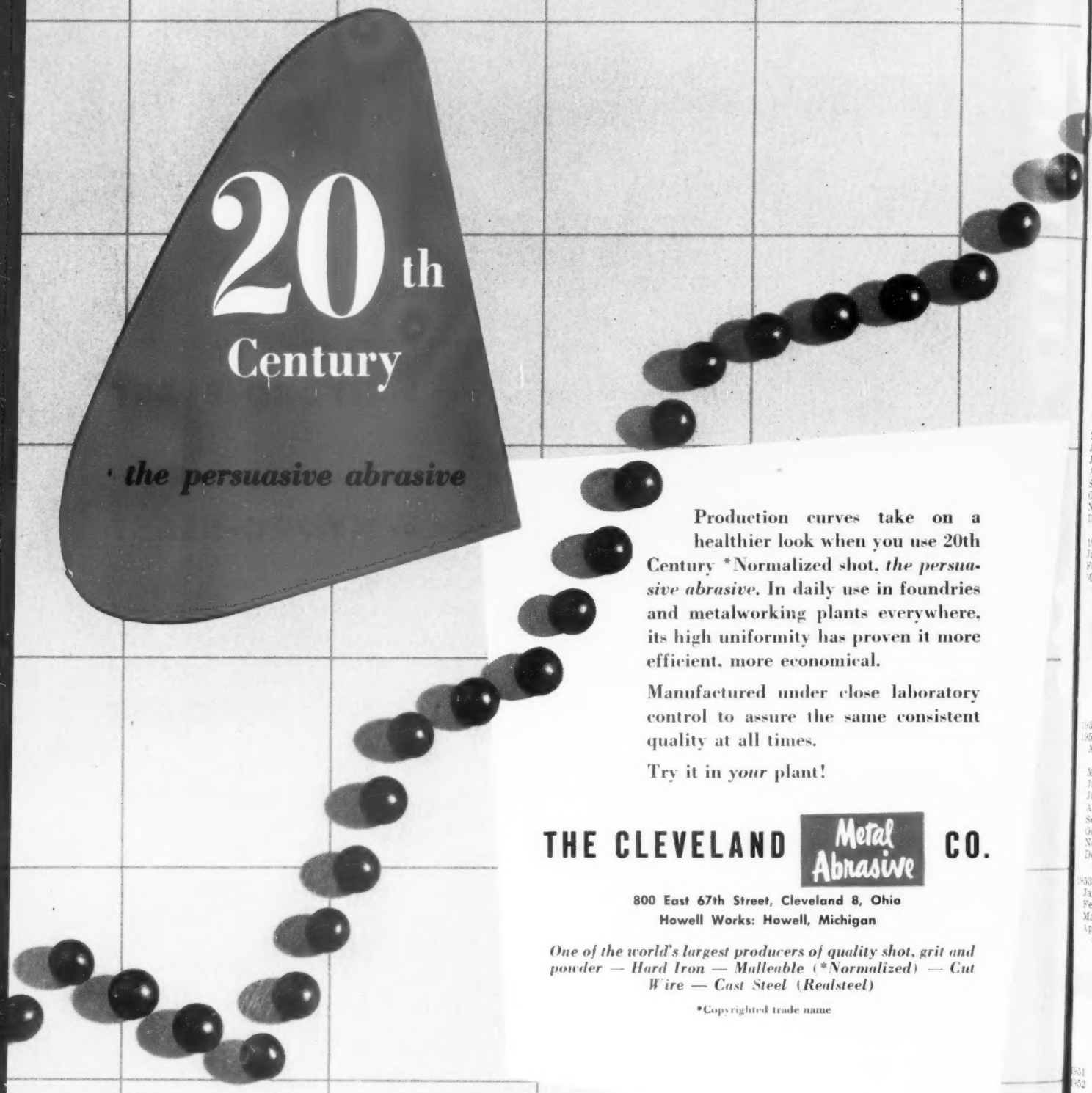

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*Copyrighted trade name

Foundry Statistics

Malleable Iron

(Shipments of castings—net tons[1])

	Shipments		Unfilled Orders[2]
	Total	For Sale	
1951	1,085,241	656,076	.....
1952			
Apr.	89,270	56,337	198,215
4 mo.	340,131	210,538	.....
May	81,770	51,476	180,382
June	74,446	46,511	173,353
July	45,266	29,675	166,517
Aug.	63,716	39,308	162,832
Sept.	75,950	45,849	168,367
Oct.	88,062	52,922	168,609
Nov.	76,099	46,708	167,842
Dec.	80,680	50,485	173,494
Total	926,120	573,472	.....
1953			
Jan.	87,249	53,272	174,809
Feb.	86,515	51,963	175,088
Mar.	94,481	57,025	177,776
Apr.	95,923	57,757	174,514
4 mo.	364,168	220,017	.....

Aluminum

(Shipments of castings—1000 pounds[1])

	Shipments				Unfilled Orders[2]
	Total	Sand	Perm. Mold	Die	
1951	515,131	193,378	160,011	151,465	.....
1952[3]					
Apr.	43,971	17,048	12,678	13,390	109,576
4 mo.	165,659	65,540	47,246	50,174	.....
May	42,094	15,984	12,297	12,717	105,284
June	39,867	15,989	10,255	12,657	108,213
July	35,275	14,014	9,232	11,302	111,518
Aug.	39,197	15,834	10,493	11,730	117,648
Sept.	45,430	16,733	12,515	15,888	127,777
Oct.	51,631	17,826	15,191	18,284	132,624
Nov.	46,483	15,419	13,463	17,372	138,461
Dec.	53,343	17,277	16,191	19,608	146,499
Total	518,979	194,616	146,883	169,732	.....
1953[3]					
Jan.	55,629	19,158	16,147	20,052	142,542
Feb.	54,864	17,583	16,698	20,272	148,557
Mar.	59,423	18,989	17,865	22,255	145,749
Apr.	61,638	20,040	18,608	22,620	140,365
4 mo.	231,554	75,770	68,778	85,199	.....

Copper-Base Alloy

(Shipments of castings—1000 pounds[1])

	Shipments			Unfilled Orders[2]
	Total	Sand	Perm. Mold	
1951	1,197,443	1,075,437	69,883	.....
1952[3]				
Apr.	85,958	76,947	5,949	83,141
4 mo.	354,611	318,374	23,754	.....
May	83,401	75,072	5,458	83,355
June	76,768	69,014	4,906	84,363
July	66,177	60,249	3,669	89,662
Aug.	78,798	71,273	5,154	89,310
Sept.	85,815	78,278	4,680	89,034
Oct.	93,102	84,544	5,518	86,779
Nov.	80,439	72,281	5,011	82,393
Dec.	90,799	81,777	5,715	76,871
Total	1,009,910	910,862	63,865	.....
1953[3]				
Jan.	85,781	76,686	5,388	80,793
Feb.	85,183	76,847	5,061	76,578
Mar.	92,798	83,639	5,716	69,490
Apr.	94,669	85,471	5,462	73,041
4 mo.	358,431	322,643	21,627	.....

Magnesium

(Shipments of castings—1000 pounds[1])

	Shipments		Unfilled Orders[2]
	Total	For Sale	
1951	30,825	28,090	.....
1952[3]			
Apr.	2,793	2,662	14,396
4 mo.	12,128	11,398	.....
May	2,734	2,607	14,163
June	2,703	2,603	13,132
July	2,405	2,303	14,052
Aug.	2,478	2,390	14,288
Sept.	3,090	2,949	16,833
Oct.	3,250	3,070	16,237
Nov.	2,959	2,785	17,053
Dec.	3,110	2,872	16,020
Total	34,857	32,977	.....
1953[3]			
Jan.	3,073	2,825	15,680
Feb.	3,225	3,033	14,834
Mar.	3,362	3,093	13,608
Apr.	3,294	3,046	12,709
4 mo.	12,954	11,997	.....

Foundry Production Workers

Estimated Number

	Mar. 1953	Feb. 1953	Mar. 1952
Ferrous	224,600	225,000	226,200
Nonferrous	82,700	82,800	73,100

Average Weekly Earnings

Gray Iron	$75.07	$74.34	$69.71
Malleable Iron	78.06	77.46	68.64
Steel	80.32	80.12	77.55
Nonferrous	83.46	82.10	77.03

Average Weekly Hours

Gray Iron	40.8	40.4	40.6
Malleable Iron	41.3	41.2	38.8
Steel	41.4	41.3	42.4
Nonferrous	42.8	42.1	42.0

Labor Turnover Rate (Mar.)

(Per 100 employees)

	Total Accession	Total Separation	Quit	Layoff
Gray Iron	5.8	4.2	2.6	0.7
Malleable Iron	4.3	3.7	2.7	0.1
Steel	3.4	3.9	2.4	0.8
Nonferrous	6.4	6.4	3.5	1.3

Source: Bureau of Labor Statistics

Gray Iron Castings—Shipments

(net tons[1])

	All Castings—Total	All Castings—For Sale	Miscellaneous Castings—Total	Miscellaneous Castings—For Sale	Heavy Steel Ingot Molds—Total	Heavy Steel Ingot Molds—For Sale	Chilled Railroad Car Wheels—Total	Pressure Pipe & Fittings—Total[4]	Soil Pipe & Fittings—Total[4]	Unfilled Orders[2]
1951	14,988,555	8,453,048	9,573,347	4,471,539	2,614,517	1,257,542	639,996	1,473,192	687,503	.....
1952										
Apr.	1,204,801	658,818	773,538	347,121	204,805	85,239	48,506	117,929	60,023	1,614,426
4 mo.	4,731,246	2,679,640	2,975,378	1,390,304	878,559	412,027	210,024	467,170	194,596	.....
May	1,100,630	624,430	698,332	317,150	186,998	91,980	44,229	117,586	53,485	1,459,305
June	835,263	502,322	616,895	292,846	19,467	10,575	44,066	103,335	51,500	1,445,521
July	636,423	431,889	407,757	227,794	14,794	10,223	40,783	96,784	56,305	1,409,684
Aug.	1,001,629	602,025	596,369	295,861	198,856	99,760	35,606	108,313	62,485	1,513,166
Sept.	1,119,373	629,708	676,732	309,299	230,219	107,987	39,912	107,847	64,663	1,450,723
Oct.	1,233,480	688,837	759,131	340,695	243,462	117,255	45,664	117,089	68,134	1,391,609
Nov.	1,060,735	593,779	649,316	296,674	218,349	104,035	41,655	99,196	52,219	1,309,252
Dec.	1,141,658	619,070	713,332	321,939	247,605	116,410	42,957	95,198	42,566	1,316,308
Total	12,860,437	7,371,700	8,113,242	3,792,562	2,238,309	1,070,252	544,896	1,312,518	651,472	.....
1953										
Jan.	1,161,945	622,392	730,216	324,330	252,181	118,514	38,385	93,930	47,233	1,333,255
Feb.	1,135,868	607,160	721,847	315,101	228,360	106,398	44,420	93,152	48,089	1,332,038
Mar.	1,264,271	674,720	800,390	341,656	250,447	119,630	41,414	114,885	57,135	1,375,886
Apr.	1,277,288	683,047	799,872	329,802	246,873	122,702	44,877	120,105	65,561	1,305,849
4 mo.	4,839,372	2,587,319	3,052,325	1,220,889	977,861	467,244	169,096	422,072	218,018	.....

Steel Castings—Shipments

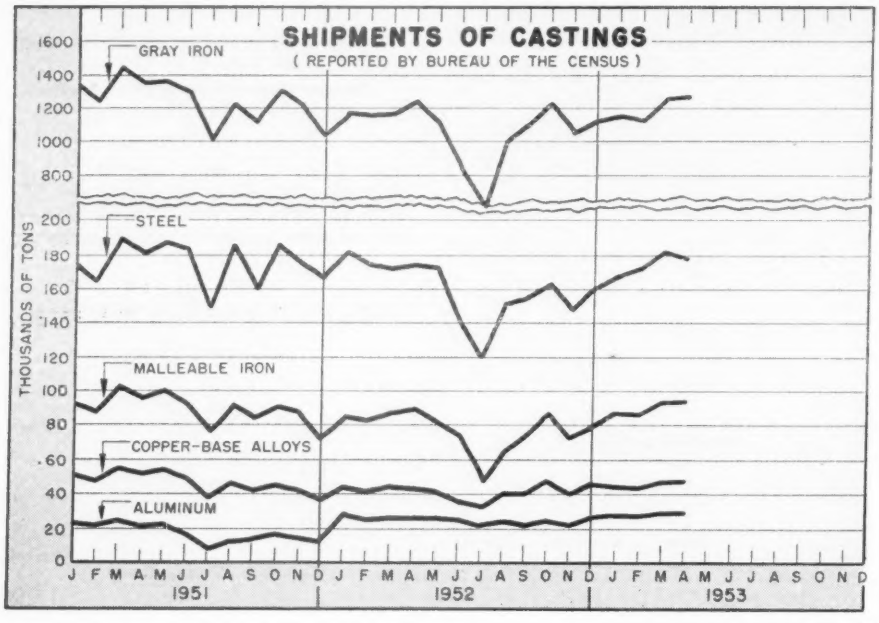
(Net tons[1])

	All Castings—Total	All Castings—For Sale	All Castings—Railway Specialties	Carbon Steel—Total	Carbon Steel—For Sale	Carbon Steel—Railway Specialties	Alloy Steel—Total	Alloy Steel—For Sale	Alloy Steel—Railway Specialties	Unfilled Orders[2]
1951	2,050,054	1,506,903	466,172	1,541,280	1,162,687	415,915	508,574	344,216	50,157	.....
1952										
Apr.	175,075	134,325	33,549	126,628	97,128	29,798	48,447	37,654	3,751	842,970
4 mo.	707,133	539,412	134,477	513,874	390,184	117,637	195,249	150,297	16,840	.....
May	173,635	132,129	35,227	125,309	95,816	30,995	48,326	37,129	4,232	804,695
June	141,628	114,410	30,455	101,850	84,388	26,815	39,778	30,818	3,640	846,459
July	119,036	97,633	20,752	81,576	67,600	18,694	37,460	30,329	2,058	855,046
Aug.	150,232	113,997	24,498	107,203	81,123	21,626	43,029	33,359	2,872	809,354
Sept.	158,392	121,402	20,686	109,011	82,968	17,843	49,381	39,190	2,843	781,929
Oct.	165,155	124,626	23,590	116,201	87,035	20,611	48,954	38,571	2,979	772,949
Nov.	148,259	110,467	23,148	105,314	77,979	20,681	42,945	33,349	2,467	751,687
Dec.	161,733	122,166	26,728	114,146	86,165	24,046	47,587	36,757	2,682	719,203
Total	1,925,203	1,476,242	339,561	1,372,494	1,053,264	298,948	552,709	430,429	40,613	.....
1953										
Jan.	167,211	126,819	27,150	118,423	118,423	24,788	48,788	38,121	2,362	706,490
Feb.	175,675	137,592	33,156	122,624	94,991	29,828	53,051	43,495	3,328	644,302
Mar.	182,181	141,873	34,364	129,055	100,069	31,772	53,126	42,286	2,592	634,600
Apr.	179,615	140,051	34,035	128,457	99,602	31,212	51,158	40,938	2,823	573,565
4 mo.	704,682	546,335	128,705	498,559	413,085	117,600	206,123	164,840	11,105	.....

[1] Source: Bureau of Census. [2] For sale only. [3] Based on new sampling method; not comparable to prior figures. [4] All cast iron pipe is shipped for sale.

(Concluded on page 144)

FOUNDRY STATISTICS (Concluded from page 143)



Index of Foundry Equipment Orders

Foundry Trades Only

(Net Orders Closed, New Equipment)

	1952	1953
Jan.	404.5	301.0
Feb.	200.4	227.3
Mar.	310.0	396.7
Apr.	385.1	303.0
May	225.2	294.4
June	353.8	...
July	343.9	...
Aug.	311.6	...
Sept.	365.9	...
Oct.	335.8	...
Nov.	258.1	...
Dec.	343.3	...

Note: Figures are percentages of the base period 1937-1939 taken as 100 per cent (monthly average). Source: Foundry Equipment Manufacturers Association.

Ingot Brass & Bronze

(Shipments in net tons)

	1952	1953
Jan.	28,315	24,423
Feb.	24,211	25,429
Mar.	23,890	28,256
Apr.	22,547	25,044
May	21,740	21,660
June	21,274	.....
July	18,947	.....
Aug.	21,807	.....
Sept.	22,770	.....
Oct.	25,811	.....
Nov.	23,441	.....
Dec.	22,983	.....
Total for year	277,736	.....

Zinc-Base Alloy

(Shipments of castings—1000 pounds[1])

	Shipments—Totals	Shipments—For Sale	Unfilled Orders[2]
1951	478,996	324,964	.....
1952[3]			
Apr.	35,008	23,640	75,966
4 mo.	137,120	94,928	.....
May	33,325	22,246	74,805
June	31,449	21,255	73,290
12 mo.	408,353	282,673	.....
1953[3]			
Jan.	45,941	30,702	88,440
Feb.	46,583	31,761	91,800
Mar.	51,673	35,460	90,266
Apr.	51,149	34,367	91,124
4 mo.	195,346	132,290	.....

Coke Production and Consumption

(Net tons)

	Production	Consumption Total	Consumption By Foundries
1951	79,133,744	78,868,124	3,664,404
1952			
May	5,956,400	5,882,713	253,605
5 mo.	31,718,100	31,237,245	1,278,975
June	2,472,940	1,772,203	219,909
July	2,376,019	1,621,308	166,377
Aug.	6,039,749	6,204,539	232,249
Sept.	6,180,804	6,517,682	269,029
Oct.	6,449,519	6,792,273	276,427
Nov.	6,316,660	6,418,639	252,805
Dec.	6,690,649	6,981,036	246,107
Total	68,244,440	67,876,964	2,955,241
1953			
Jan.	6,767,814	6,884,585	248,557
Feb.	6,132,084	6,263,083	237,670
Mar.	6,835,310	6,875,568	275,442
Apr.	6,538,477	6,536,195	272,22[illegible]
May	6,821,580	6,748,576	276,01[illegible]
5 mo.	33,093,948	33,308,007	1,309,93[illegible]

Pig Iron Production and Consumption

	Production** (Standard grades—1000 net tons) Total	Foundry	Malleable	Basic	Low Phos. Intermediate Low Phos. & Bessemer	Consumption* (By type of furnace, 1000 gross tons) Total	Cupola	Air	Electric
1951	70,264.5	3,186.2	3,169.0	55,134.1	8,774.8	63,760	5,731	354	136
1952									
May	5,414.2	245.4	236.0	4,295.6	637.2	4,823	412	25	8
5 mo.	28,471.5	1,217.8	1,274.8	22,430.6	3,513.5	25,680	2,198	138	48
June	1,043.2	133.7	103.1	758.6	47.7	991	342	20	5
July	981.6	119.7	118.3	712.9	30.7	845	250	12	8
Aug.	5,767.3	262.9	280.6	4,553.8	669.9	5,063	423	9	8
Sept.	6,069.3	294.7	306.6	4,757.0	710.9	5,363	417	21	9
Oct.	6,415.3	280.0	299.4	5,091.6	744.2	5,812	463	24	9
Nov.	6,138.9	262.0	315.4	4,842.6	718.8	5,472	397	21	12
Dec.	6,414.7	293.4	315.1	5,106.9	699.2	5,685	419	24	14
Total	61,306.8	2,864.2	3,013.3	48,254.0	7,174.9	54,911	4,909	269	113
1953									
Jan.	6,470.6	274.9	285.5	5,201.5	708.8	5,784	425	24	12
Feb.	5,802.6	187.0	294.6	3,640.7	680.3	5,027	418	24	14
Mar.	6,601.1	263.9	358.1	5,256.1	723.0	5,873	466	27	14
Apr.	6,161.6	244.7	327.1	4,885.6	704.2	.....	.....	.....	.....
May	6,508.5	210.0	347.7	5,237.0	713.8	.....	.....	.....	.....
5 mo.	31,544.4	1,180.5	1,613.0	25,220.9	3,530.1	.....	.....	.....	.....

Iron and Steel Scrap Consumption

(Gross tons*)

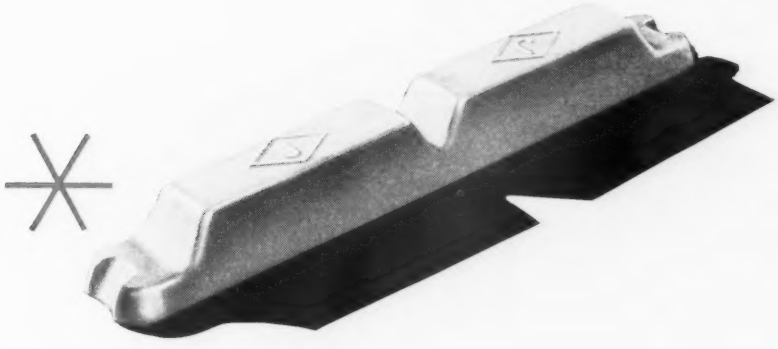
	All Scrap—Total	All Scrap—Purchased	By Types of Furnace: Cupola—Total	Cupola—Purchased	Air—Total	Air—Purchased	Electric—Total	Electric—Purchased
1951	68,518,208	33,822,431	11,090,607	5,878,939	1,203,740	441,099	8,391,919	5,389,0[illegible]
1952								
Mar.	5,902,529	2,860,364	791,165	415,853	92,751	35,013	741,793	475,1[illegible]
3 mo.	17,322,046	8,350,882	2,127,349	1,285,067	288,862	108,699	2,182,345	1,385,6[illegible]
Apr.	5,360,417	2,657,926	834,066	440,035	106,059	38,888	684,318	427,3[illegible]
May	5,369,258	2,660,471	779,436	404,899	94,597	35,966	700,617	455,4[illegible]
June	2,048,951	1,169,102	719,739	374,127	82,357	30,412	285,596	173,7[illegible]
July	1,965,007	1,156,296	524,651	278,750	52,999	19,733	364,536	244,9[illegible]
Aug.	5,470,696	2,738,593	721,255	348,181	74,351	28,091	682,405	446,5[illegible]
Sept.	5,782,986	2,862,994	760,092	389,910	82,212	30,493	761,795	501,6[illegible]
Oct.	6,256,031	3,066,041	851,458	439,401	98,947	37,743	814,565	546,1[illegible]
Nov.	5,960,435	2,885,008	731,825	379,950	80,228	30,502	780,042	518,3[illegible]
Dec.	6,089,722	2,973,633	804,275	412,177	92,621	35,064	758,845	491,0[illegible]
Total	61,625,549	30,520,946	9,154,146	4,752,497	1,053,233	395,591	8,015,064	5,190,8[illegible]
1953								
Jan.	6,256,718	3,061,551	810,254	413,971	95,430	35,695	795,292	517,9[illegible]
Feb.	5,802,854	2,817,896	818,375	422,306	92,371	35,234	745,179	478,4[illegible]
Mar.	6,536,867	3,211,476	901,786	464,110	103,034	38,583	857,760	563,4[illegible]
3 mo.	18,596,439	9,090,923	2,530,415	1,300,381	290,837	109,512	2,398,231	1,559,8[illegible]

*Source: U. S. Dept. of Interior, Bureau of Mines. **Source: American Iron & Steel Institute. [1]Source: Bureau of the Census. [2]For sale or [3]Based on new sampling method; not comparable to prior figures.

THERE IS NO SUBSTITUTE

ALMAG 35

ALUMINUM ALLOY



U. S. Patent Nos. 2564044, 2628899, 2583473

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Almag 35 properties are the result of years of exhaustive testing by government arsenals and laboratories, and such outstanding organizations as Battelle Memorial Laboratories, Lucius Pitkin Inc. and Robert W. Hunt Co. These tests have resulted in a high demand for Almag 35 on all critical physical-property applications, and also in the establishment of military specifications Mil-A-10935-6-7.

There is only one Almag 35. It supplies all vital properties as-cast . . . without heat-treatment. Accept no substitutes.

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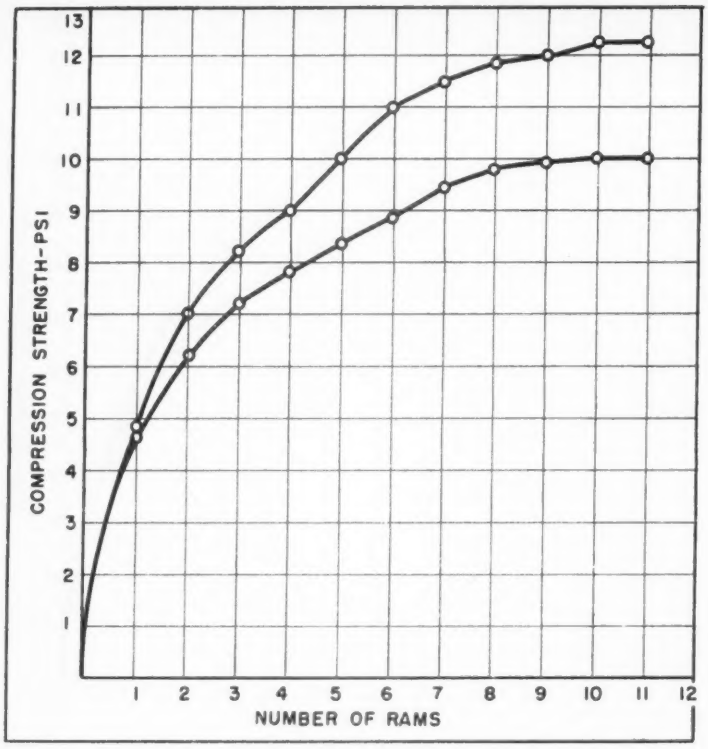


Fig. 1—Relationship of pressure to strength for two high pressure resins, using a standard rammer

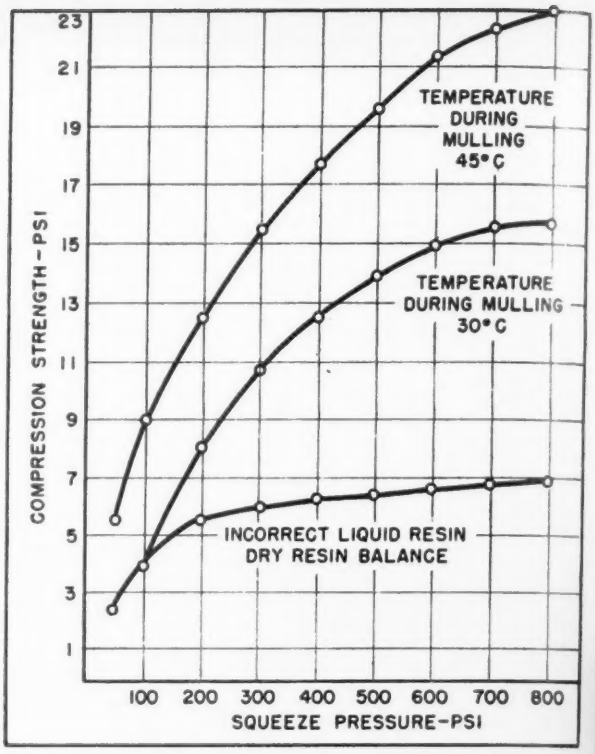

TEMPERATURE DURING MULLING 45° C
TEMPERATURE DURING MULLING 30° C
INCORRECT LIQUID RESIN DRY RESIN BALANCE
COMPRESSION STRENGTH-PSI
SQUEEZE PRESSURE-PSI

Fig. 2—Pressure-Strength curves, showing the effect of the mulling temperature and resin balance

Studies High Pressure Molding

By PROF. RICHARD HEINE
and
TOM BARLOW

IN RECENT months reports concerning high-pressure molding research at the University of Wisconsin have been circulated within the foundry industry. Some may have been misleading; some have come close to fact. Purpose of this discussion is to clarify the situation concerning this research and foundry development at the University of Wisconsin under the sponsorship of Eastern Clay Products Department of International Minerals and Chemical Corp., Chicago.

High-pressure molding consists of molding green sand under unusually high pressures. In many cases pressures have been approximately 600 psi. Some work as low as 80 psi has been included. Sand used is more nearly related to ordinary green sand than to resin or oil core sand. However, the sand is unusual in that no water is used. Strength is obtained by the activation of a resin coating by an organic solvent. The process is related to the original waterless sand described in 1946 by B. H. Weston, although the materials used are not entirely the same.

Easiest way to discuss the work being done with high pressures is to start with the objectives of the process. There have been many attempts to use higher molding pressures in past years. Early patents on stack molding discussed pressures which closely approximated pressures being studied today. During World War II, several foundries striving for precise casting dimensions worked along the line of higher squeeze pressures. However, these attempts have been limited by characteristics of molding materials.

One principal limitation has been a lack of flowability which prevented close reproduction of the pattern, even with high pressures. This factor required development of a molding medium with unusual ability to flow, and to continue to flow under increasing loads. Waterless sands studied during this project have the flowability required. For example, with this material, 150 grams of sand are used to make a 2-in. standard green strength specimen under ordinary pressure. But the same sand molded at 600 psi requires 180 grams or more to make the same size specimen. This represents a 20 per cent increase in density as a result of flowability under pressure.

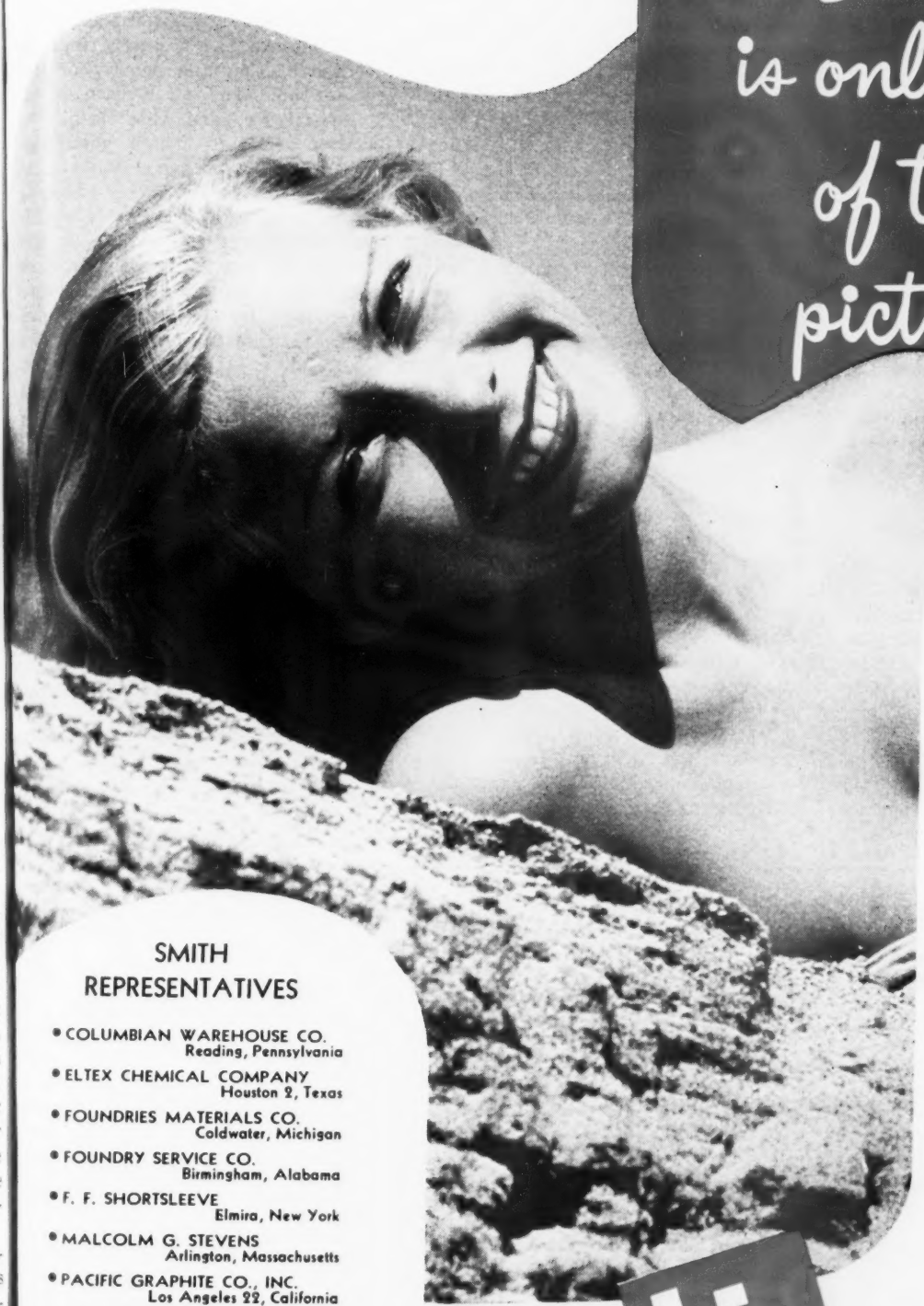
Another limitation of normal sand is the excess water present. High pressures will squeeze water out of molding sand and deposit it on the pattern as mud. Theoretically, a perfect proportion of moisture and clay might resist such a water extraction, but ideal proportions of sand, clay and water are not commercially practical. Furthermore, if they were available, they would lack workability. For that reason, the research work has utilized the process for waterless sand. In this process, the sand grain is coated in use with a carbon resin or combination of carbon-resins. These resins are then made sticky or tacky by the action of solvent or solution, somewhat as clay is made sticky by the addition of water. The process was first reported in FOUNDRY, November, 1945.

A further limitation to high pressure molding work in the past has been a lack of adequate molding, pattern and flask equipment. The pattern must have a hard finish. No lead, solder or wax fillets and fillings can be used. Surface must be smooth and without even minute back-draft. Patterns must be mounted tightly against the pattern plate. Cope-and-drag equipment probably is essential because matchplates could not withstand high pressures being used. Flasks must be strong and rigid. (The research work was actually done

(*Continued on page* 148)

REMEMBER THIS...

Sand is only part of the picture



SMITH REPRESENTATIVES

- COLUMBIAN WAREHOUSE CO. Reading, Pennsylvania
- ELTEX CHEMICAL COMPANY Houston 2, Texas
- FOUNDRIES MATERIALS CO. Coldwater, Michigan
- FOUNDRY SERVICE CO. Birmingham, Alabama
- F. F. SHORTSLEEVE Elmira, New York
- MALCOLM G. STEVENS Arlington, Massachusetts
- PACIFIC GRAPHITE CO., INC. Los Angeles 22, California
- ST. LOUIS COKE & FOUNDRY SUPPLY CO. *(formerly M. W. Warren Coke Co.)* St. Louis, Missouri
- WESTERN FOUNDRY SAND CO. Seattle, Washington
- WESTERN INDUSTRIAL SUPPLY CO. Portland 14, Oregon

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SMITH OIL & REFINING CO.

MANUFACTURERS OF L-O AND CERTIFIED CORE OILS
INDUSTRIAL OILS DIVISION • ROCKFORD, ILLINOIS

(Continued from page 146)

using coreboxes since the small molds were so strong they could be handled and poured without either jackets or flasks.)

Molding equipment was developed by Donald Gerlinger of Walter Gerlinger Inc., Milwaukee. It is essentially a hydraulic-squeeze strip machine, although diaphragm squeeze is not out of the question, at least at medium pressures. Any attempt to jolt makes the sand jump up and down in the flask. However, high pressure squeezing provides maximum density throughout the mold without the need for jolting, tucking, peening or ramming.

Mulling of the sand is necessary. Heat is essential to proper mulling and this can be supplied by action of the muller or by preheating the sand prior to mulling. (There is no moisture loss problem with hot sand because there is no moisture to lose). With hot sand, some modifying of the proportions of liquid and dry resins also is necessary.

With this background on requirements and problems, it becomes relatively simple to describe results of the work to date. The research phase has reached the position from which pilot plant and semicommercial runs are being made. Much of the pilot plant work or demonstration is being done using testing equipment such as a standard "tensile machine" to develop the high pressures required. Only one commercial molding machine has been built for maximum pressures so that commercial type runs must be limited temporarily. This machine is being studied by Motor Castings Co., Milwaukee. In the meantime, much of the work is being done at medium pressures by using a pattern and flask no larger than the pressure cylinder of the molding machine. In this way, the molding pressure is equal to the line pressure or approximately 100 psi.

For initial use, a clean, fine silica sand is required. Preferred sand is about 90 AFS fineness with a screen distribution on 4 screens and adequate fines. An average fineness of 110 to 130 also has been used successfully. The clean sand is first treated with 1 to 1½ per cent liquid resin with sufficient mulling to distribute the viscous liquid over the sand grains. With heated sand this part of the cycle can be 60 seconds. The liquid resin is followed by an addition of from 0.5 to 1.5 per cent dry resin. This dry resin increases the viscosity of the liquid and, by both chemical and physical reaction, develops strengths on the order of 4 to 7 lb on a green compression testing machine using three rams and a standard 2-in. specimen. This phase of the mulling requires another 60 seconds. The last addition is either clay (apparently southern bentonite is preferred) or silica flour or both. This addition "drys up" the sand and develops some additional strength.

Operating strength of the sand is developed under pressure as illustrated in Figs. 1 and 2. Fig. 1 shows how repeated ramming brings the strength up to 10 to 13 lb green strength. Fig. 2 illustrates effect of pressure in creating strength of from 18 to 30 lb. Strengths up to 60 lb can be developed by larger additions of resin but are not normally required because of the high density of this type of mold. The lower curve in Fig. 2 illustrates a sand which is not "in balance." This is not a good high pressure molding sand. It contains either excessive liquid or excessive dry resin. A skilled operator readily can determine the nature of the trouble "by feel." Response to pressure is an accurate method of evaluating high pressure sands to determine the proper balance for a given sand and type of mulling equipment.

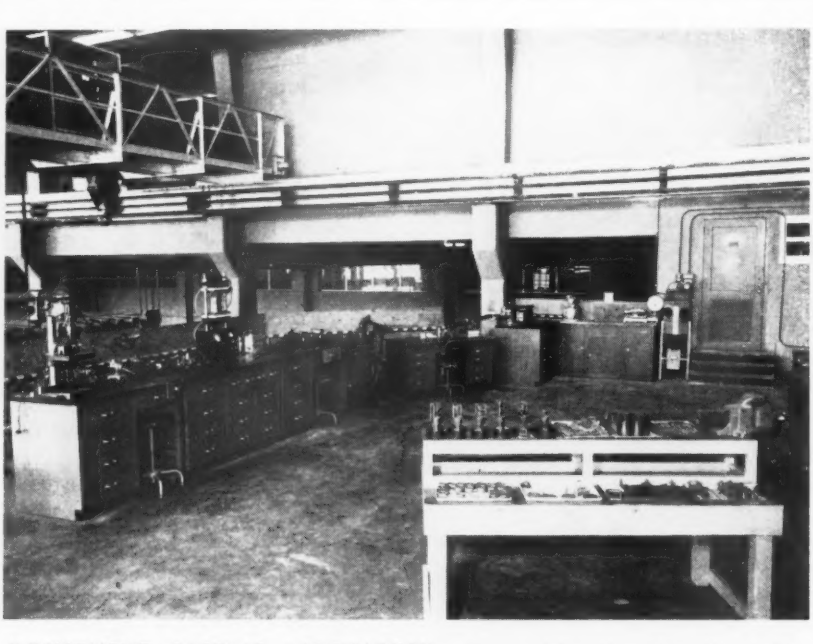
Sand May Be Reused

This applies primarily to the initial use of the sand. The sand can be shaken out and reused as in a normal system. During pouring, the heat of the casting coats the grain of sand with resin. Therefore, on reuse, the mulling pressure and temperature is much less critical. Normal addition for make-up is liquid resin. However, long commercial runs may indicate a need for additional dry resin from time to time to maintain the proper level of "organics." In most work, we have found that no additions are required for the first few turnovers or uses of the sand. This indicates that the losses of resin on reuse are expected to be low.

Having no moisture to contend with, the sand has almost infinite bench life. It is indicated that sand may be made today and used tomorrow—or next week, without difficulty. Another interesting feature is the elimination of riddling or screening a facing on the pattern. Lumps do not constitute a problem because the sand flows so rapidly under pressure. Molds frequently have been made and broken afterward (intentionally) into three or four chunks. The chunks are put back into the flask and remolded exactly as with new sand. The extended bench life is reflected also in the absence of heat sand problems. In fact, some heat is required for the initial use of the sand or until such time as casting heat has permitted the resin to coat the grains.

Metals cast in high pressure molds at the time of writing include gray iron, malleable iron, nodular iron, brass, bronze and aluminum. In most cases, cleaning time is at a minimum. Over-cleaning can quickly roughen the surfaces obtained or

(Please turn to page 229)



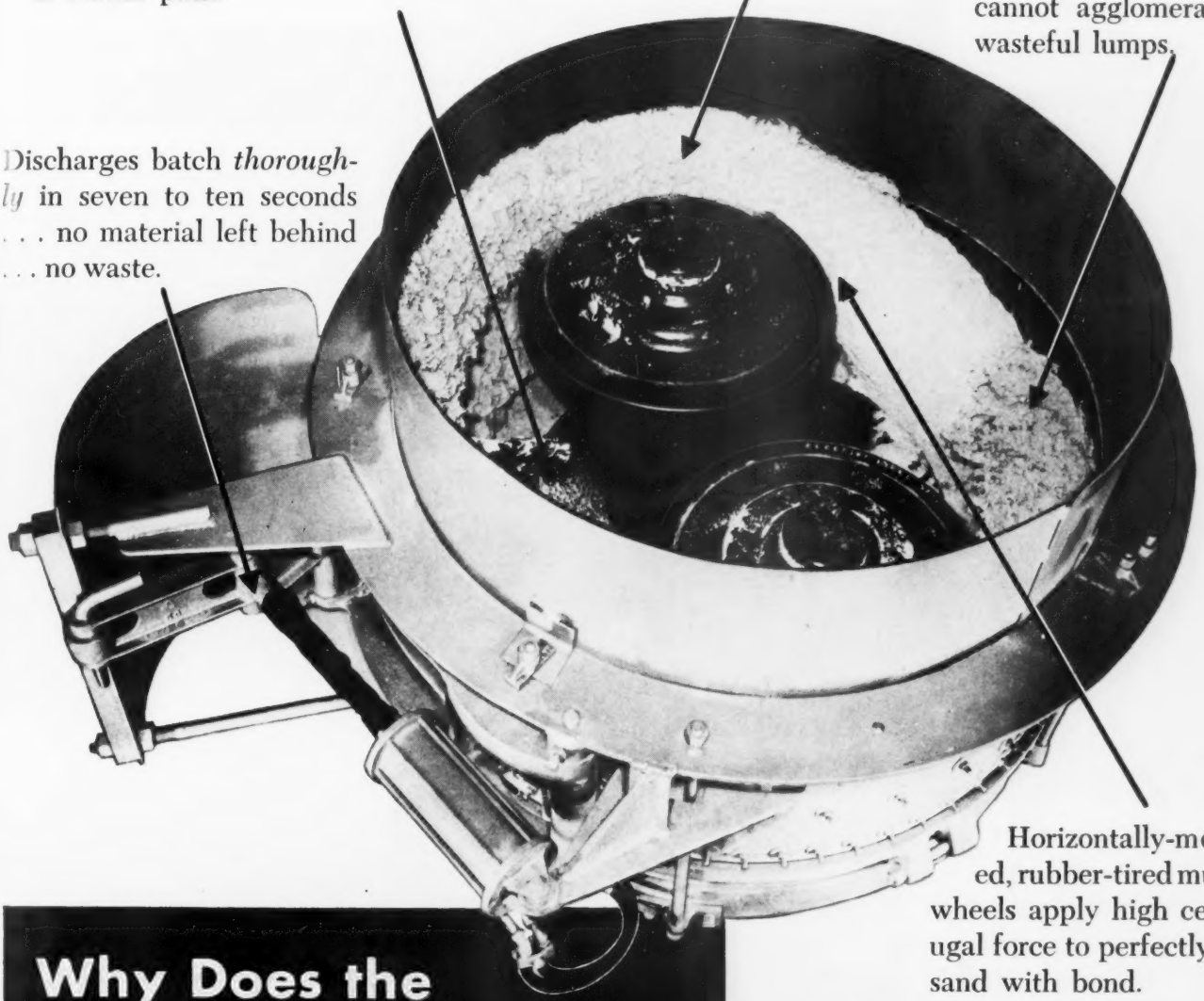
INVESTMENT CASTING LABORATORY: A precision investment casting laboratory has been installed at the Naval Ordnance Test Station, Inyokern, China Lake, Calif., to provide a new fabrication facility for the development of prototypes and the experimental pilot production of complex ordnance components. This is a general view of the laboratory

New efficiency—contoured plows keep sand and bonding materials in mullor path.

Sand mulled between rubber mullor tire and rubber liner . . . rubber distributes bond better than metal by *squeezing* it around grains.

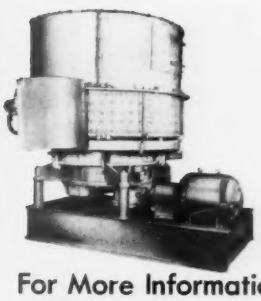
Thorough aeration during mulling . . . bond cannot agglomerate in wasteful lumps.

Discharges batch *thoroughly* in seven to ten seconds . . . no material left behind . . . no waste.



Horizontally-mounted, rubber-tired mulling wheels apply high centrifugal force to perfectly coat sand with bond.

Why Does the SPEEDMULLOR Cut Material Costs One-third to One-half?



When mulling efficiency goes up, the amount of expensive bonding additions needed to obtain specified properties goes down. That's why the Speedmullor's more efficient *rubber-to-rubber* mulling means material savings of one-third to one-half.

Independently conducted tests have proven that the Speedmullor coats sand with bond *more than three times as fast and up to twice as thoroughly* as the old metal-to-metal mixers.

Add to between-rubber mulling, the advantages of aeration during mulling, a fast thorough discharge, and high-pressure centrifugal mullors; and you'll see why the Speedmullor saves one-third to one-half on materials.

For More Information About the **SPEEDMULLOR** Write to

BEARDSLEY & PIPER DIVISION OF PETTIBONE MULLIKEN CORPORATION
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LOOK TO BEARDSLEY & PIPER FOR BETTER METHODS

MEMBER FEMA

SANDSLINGER

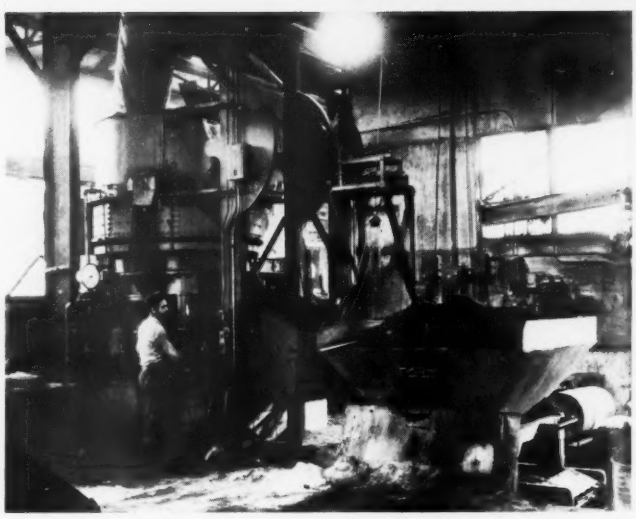
Flask and pit molds are rammed on both sides of the slinger's track.

Cuts Molding Time in Half at ST. MARYS FOUNDRY!

A single Speedmullor-Preparator Unit prepares all molding and core sand

Top quality machine tool castings, weighing up to 12,000 lbs., are produced at the St. Marys Foundry Co., St. Marys, Ohio. To do the job right, this foundry uses a Motive Sandslinger to ram all of the medium and large molds, and a Speedmullor-Preparator Unit to thoroughly condition and mull all molding and core sand.

St. Marys management reports that the slinger cuts molding time in half on their average mold. The Speedmullor-Preparator Unit replaced a smaller Speedmullor that was in operation over eleven years with *no* downtime.



All of the foundry's molding sand is conditioned and mulled during the day. Core sand is prepared in two hours each night.

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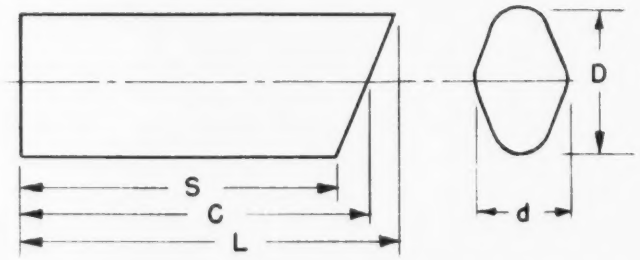
Formulas for Determining Weights of Castings

Aug

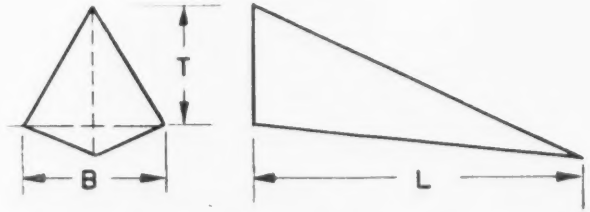
Formulas for Determining Weights of Castings

(Continued from July)



To find the weight of a truncated elliptical cylinder, multiply the small diameter by the large diameter, by the distance on the center line from the base to the inclined section, by the value of k. C is equal to one-half the sum of S and L.

$$W = D\ d\ C\ k$$



To find the weight of a triangular pyramid, multiply the width of the base by its thickness, by the length, by the constant, k, corresponding to the weight per cubic inch of material used. (See Table IV).

$$W = B\ T\ L\ k$$

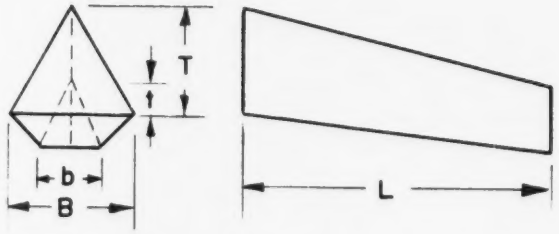
Table IV

Wt. per cu. in.	k	Wt. per cu. in.	k	Wt. per cu. in.	k	Wt. per cu. in.	k	Wt. per cu. in.	k	Wt. per cu. in.	k
.096	.0160	.170	.0283	.250	.0417	.330	.0550	.410	.0683	.490	.0817
.100	.0167	.180	.0300	.260	.0433	.340	.0567	.420	.0700	.500	.0833
.110	.0183	.190	.0317	.270	.0450	.350	.0583	.430	.0717	.510	.0850
.120	.0200	.200	.0333	.280	.0467	.360	.0600	.440	.0733	.520	.0867
.130	.0217	.210	.0350	.290	.0483	.370	.0617	.450	.0750	.530	.0883
.140	.0233	.220	.0367	.300	.0500	.380	.0633	.460	.0767	.540	.0900
.150	.0250	.230	.0333	.310	.0517	.390	.0650	.470	.0783	.550	.0917
.160	.0267	.240	.0400	.320	.0533	.400	.0667	.480	.0800	.560	.0933

Interpolation Table

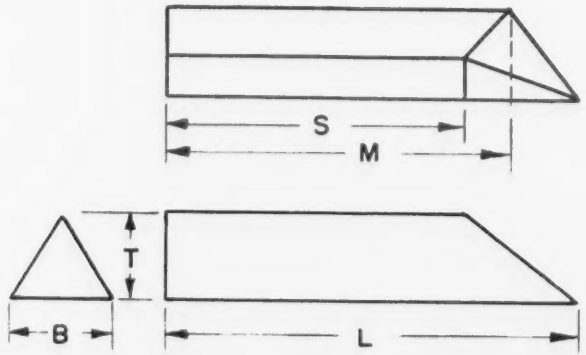
Additional Wt.	Additional k	Additional Wt.	Additional k	Additional Wt.	Additional k
.001	.0002	.004	.0007	.007	.0012
.002	.0003	.005	.0008	.008	.0013
.003	.0005	.006	.0010	.009	.0015

For method of interpolation see Table II.



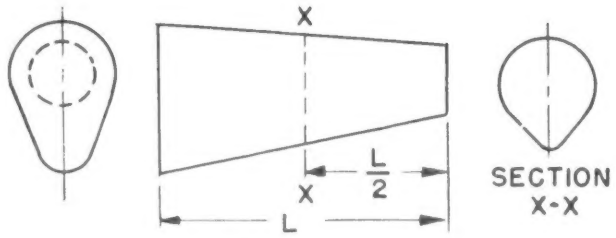
To find the weight of a frustrum of a triangular pyramid, first find the sum of the products of the breadth of the large base by its thickness, the breadth of the small base by its thickness, and the breadth of the large by the thickness of the small base; then multiply this sum by the length by the value of k and the product is the required weight.

$$W = (BT + bt + Bt)\ L\ k$$



To find the weight of a truncated triangular casting, multiply the thickness of the base, by its breadth, by the sum of the lateral edges, by the value of k.

$$W = TB\ (L + M + S)k$$



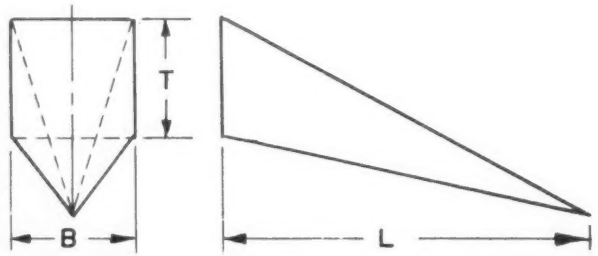
To find the weight of a prismoid or solid generated by a straight line moving over the boundaries of two parallel ends, multiply the sum of the area of the large end, four times the area of the mid-section and the area of the small end by the length, by the value of k in Table IV.

$$W = (A + 4M + E)\ L\ k$$

A = Area large end

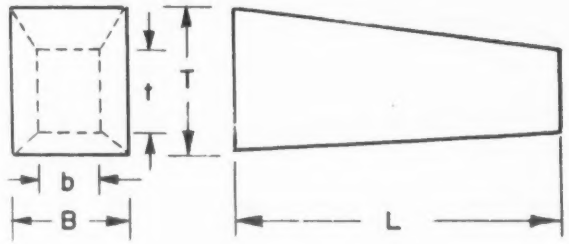
M = Area mid-section, X-X

E = Area small end



To find the weight of a pyramid with rectangular base, multiply the thickness of the base by the breadth, by the length, by the constant K, corresponding to the weight per cubic inch of material used (Table V).

$$W = T\ B\ L\ K$$



To find the weight of a frustrum of a rectangular pyramid, first find the sum of the products of the breadth of the large base by its thickness, the breadth of the small base by its thickness and the breadth of the large by the thickness of the small base; then multiply this sum by the length, by the value of K (Table V) and the product is the weight required.

$$W = (BT + bt + Bt)\ L\ K$$

Table V

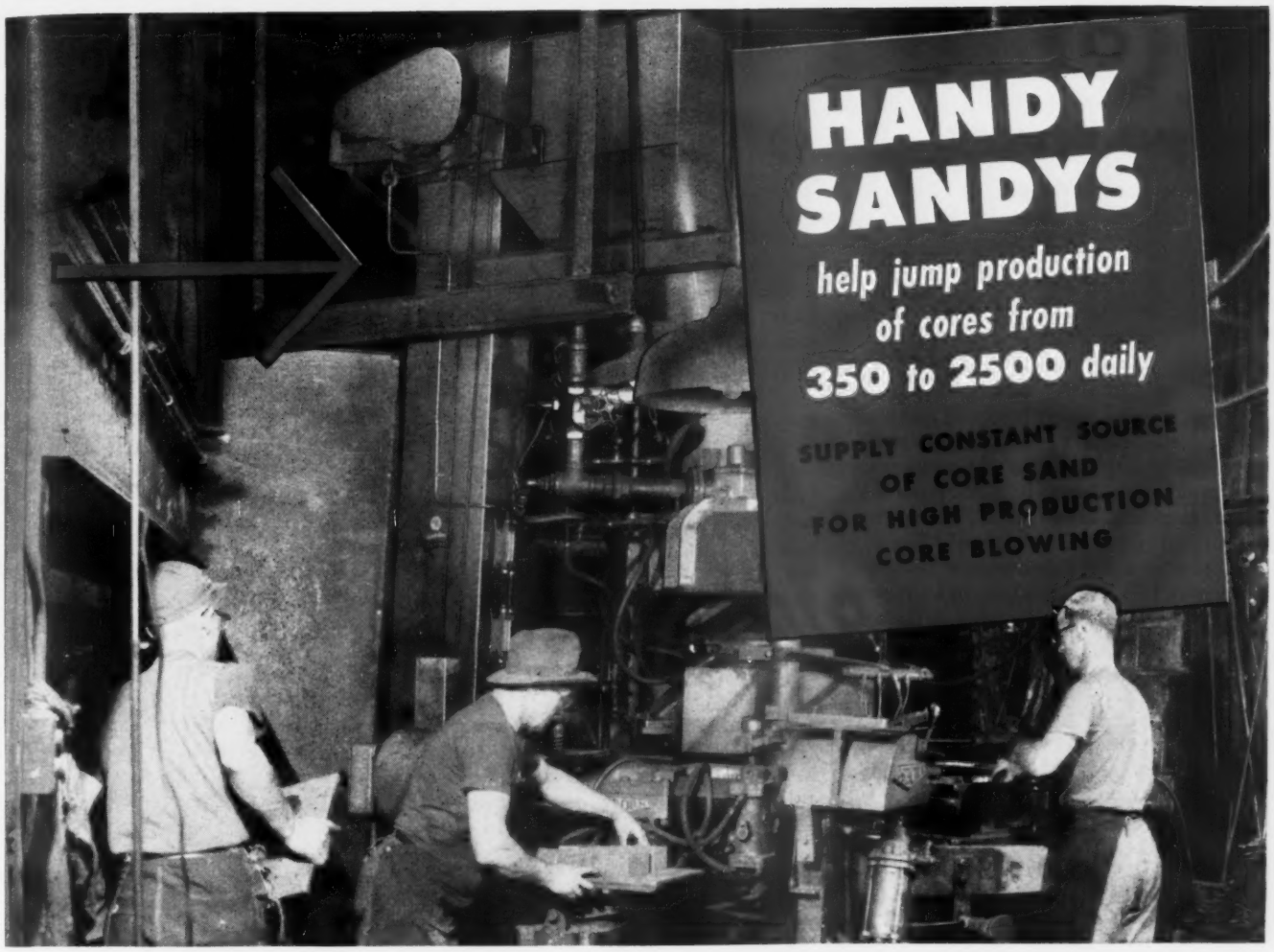
Wt. per cu. in.	K	C	Wt. per cu. in.	K	C	Wt. per cu. in.	K	C	Wt. per cu. in.	K	C
.036	.0320	.3016	.210	.0700	.6597	.330	.1100	1.037	.450	.1500	1.414
.100	.0330	.3142	.220	.0733	.6912	.340	.1133	1.068	.460	.1533	1.445
.110	.0367	.3456	.230	.0767	.7226	.350	.1167	1.100	.470	.1567	1.477
.120	.0400	.3770	.240	.0800	.7540	.360	.1200	1.131	.480	.1600	1.508
.130	.0433	.4084	.250	.0833	.7854	.370	.1233	1.162	.490	.1633	1.539
.140	.0467	.4398	.260	.0867	.8168	.380	.1267	1.194	.500	.1667	1.571
.150	.0500	.4712	.270	.0900	.8482	.390	.1300	1.225	.510	.1700	1.602
.160	.0533	.5027	.280	.0933	.8796	.400	.1333	1.257	.520	.1733	1.634
.170	.0567	.5341	.290	.0967	.9111	.410	.1367	1.288	.530	.1767	1.665
.180	.0600	.5655	.300	.1000	.9425	.420	.1400	1.319	.540	.1800	1.696
.190	.0633	.5969	.310	.1033	.9739	.430	.1433	1.351	.550	.1833	1.738
.200	.0667	.6283	.320	.1067	1.005	.440	.1467	1.382	.560	.1867	1.759

Interpolation Table

Add'l Wt.	Add'l K	Add'l C	Add'l Wt.	Add'l K	Add'l C	Add'l Wt.	Add'l K	Add'l C
.001	.0003	.0031	.004	.0013	.0126	.007	.0023	.0220
.002	.0007	.0062	.005	.0017	.0157	.008	.0027	.0251
.003	.0010	.0091	.006	.0020	.0188	.009	.0030	.0283

For method of interpolation see Table II.

(To Be Continued)


HANDY SANDYS
help jump production of cores from 350 to 2500 daily
SUPPLY CONSTANT SOURCE OF CORE SAND FOR HIGH PRODUCTION CORE BLOWING

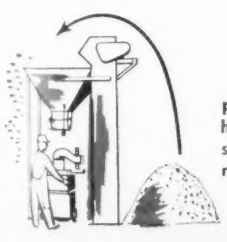
Lakey Foundry and Machine Co., Muskegon, Michigan, had the problem of how to turn out cores in greater numbers, faster and at less cost.

Previously the cores were made by hand ramming, and one man could make up to 350 cores per 8-hour day. Now the Newaygo Handy Sandy in conjunction with a Rotary Core Blower can put out well over 300 cores per hour, or at least 2,500 cores per 8-hour day. Three men work on the unit.

A second Handy Sandy has been recently installed to operate in conjunction with a large Core Blowing Machine and a Core Rollover which when in full production will blow cores at 100 cores per hour with 1 man as against the hand method of 35 per hour per man.

Regular Handy Sandys were installed, with special storage hoppers and wing boards and special feed hoppers, developed by Newaygo to meet the problem of lack of space in the core room. The storage hoppers are fed by overhead trams that periodically drop core sand into them, from which the sand is elevated overhead into the special feed hoppers and directly into the core blowing units. Each Handy Sandy is capable of feeding over 8 tons of core sand per hour to each core blowing unit. The cores average from 14 to 50 lbs. each.

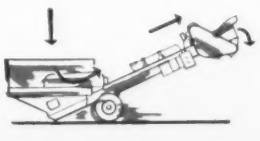
The primary purpose of the Handy Sandys in these installations is to provide core sand for *high production core blowing at low cost.* The units are practically maintenance free, and being fully automatic, eliminate hand ramming and shoveling of any type.



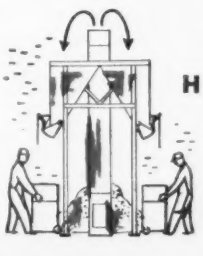
HANDY SANDY

puts sand overhead, eliminating shoveling for the molder.

REDDY SANDY



takes the hard work out of shakeout and sand preparation.



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Around the Country

NEWS REPORTS FROM

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Washington
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Chicago
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ON VARIOUS occasions this column has discussed thefts of metals, alloys and even castings from nonferrous foundries in the Chicago area. FOUNDRY for June, p. 188, reported that a group of about 35 foundries affiliated with the Chicago Chapter of the Non-Ferrous Founders' Society sponsored a two-column newspaper advertisement early in May offering rewards up to $2500 for information leading to the arrest and conviction of persons involved in the burglaries. Copies of the advertisement were posted prominently in police stations.

In connection with the reward, the publicity it received and the activities of the protective committee, the following log of events tells its own story:

A truck of a brass foundry on Chicago's near west side loaded with approximately 1500 lbs. of castings was stolen from in front of the foundry on May 22.

The load was transferred from the truck to a private car on Lake St.

The private car and stolen castings were taken to a private garage.

In transferring of the castings a few were dropped in the alley. Suspicious neighbors called police.

Police did not know about the robbery but suspected "hot metal."

Police checked the private car in the private garage and verified that the castings were stolen. Waited for owner of the car and made arrest.

Investigation showed that truck stolen from foundry was used in another robbery same night. Truck returned to private garage loaded with copper and brass strip and rod. Driver and crew were arrested.

Truck and its original load of castings were returned to the brass foundry on May 23.

Three defendants were convicted in court and jailed May 27.

Reward paid to police June 8.

Last heats of steel for military tank hulls and turrets were poured by American Steel Foundries at the government-owned Cast Armor Plant, East Chicago, Ind., during second week in July. This is in keeping with instructions from the Ordnance Department to place the plant in standby status by early October. Since late April when the government's intention was announced, the company has been confronted with a most difficult manpower problem. All castings made must be cleaned and processed for shipment yet much of the worker personnel has drifted away progressively to jobs offering permanence. So short has been the labor supply recently that the company has been obliged to train new welding and other crews to keep work moving.

In June this column told how Meta-Mold Aluminum Co., Cedarburg, Wis., dedicated and held open house in a new office building in April by holding an art exhibit. Now the company and its affiliate, the Meta-Mold Magnesium Corp., are conducting another art show.

This second exhibit, to be open every Saturday and Sunday through Labor Day, features paintings for sale. The two companies will conduct an unprecedented finance service for buyers whose yearning for beauty outreaches their purses.

DUE TO VACATIONS and hot weather, district foundry operations in July were off 15 to 20 per cent from the preceding month. A slight improvement may take place in August, but there will be no full recovery of lost ground until September, if then. There will still be considerable time off for vacations in August, and besides foundries will continue to be bucking hot temperatures.

Gray iron shops are somewhat encouraged over prospects for better business, once summer influences have run their course. Actually, there was a spurt in June, which held until about the last week. Foundrymen are inclined to think that this improvement will again take hold once operating conditions become more favorable. Currently, gray iron shops here have backlogs of a month or maybe a little more, although admittedly extension of backlogs reflects in part restricted operating conditions.

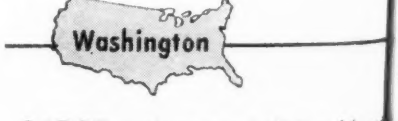
There is less machine tool business but at least a well sustained demand for power plant requirements. Demand for castings for pumps and air compressors remains strong. There is a continued spurt for castings for air compressors for large air conditioning units. Where gray iron operations are not affected by vacation schedules they appear to be averaging at around 85 per cent of normal.

Malleable shops are still somewhat in the doldrums, apart from seasonal influences. Railroad requirements are sluggish, and there is relatively little in the East in the way of automotive specifications. Most shops are unable to do better than 70 per cent of normal, even when operations are not affected by vacations.

Backlogs at the steel foundries continue to drop sharply. This reflects in major degree the decline in defense work. Most steel foundries now can promise deliveries within two months and even better in some cases. Barring suspensions and the staggering of schedules for vacations, steel foundries are operating at around 90 per cent of normal. Brass and bronze shops, on the same basis, are producing at around 80 per cent.

White metal shops are the most active of all foundries in this district. At least one shop, engaged in the production of both aluminum and magnesium, is operating seven days a week. Electronic devices, radar and various aircraft requirements account in particular for the activity in this field.

Raw materials supply is adequate. One continued difficulty, however, is the shortage of skilled help in foundries engaged in production of large castings.



LARGE savings are being achieved by the Army Ordnance Corps in producing small gun castings—weighing 3½ lb and less—by the investment casting process. Many thousands of castings are being produced monthly by this method at the Watervliet, N. Y., Arsenal. In the great majority of cases, these castings replace forg-

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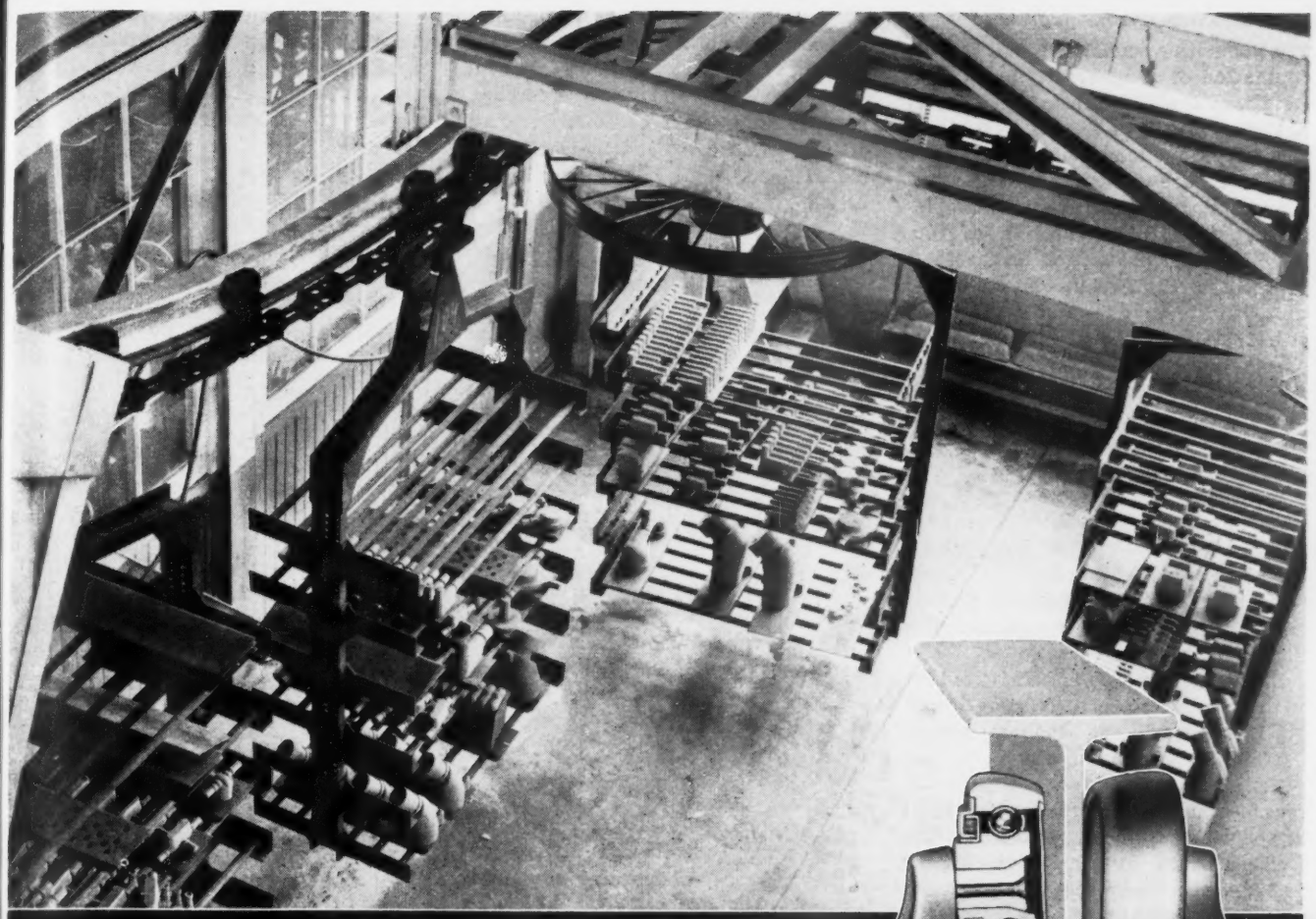

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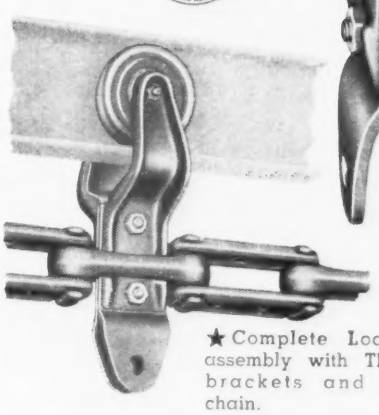
★ No. 4207J Loadstar wheel, cutaway showing felt and steel seal.



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Engineering Offices or Sales Agencies in Principal American and Canadian Cities

(*Concluded from page 154*)

ings, and the savings result from elimination of most of the machining operations that were necessary on the forgings. Also, investment casting permits production of intricate castings which are difficult to make with normal practice. A recent example is the successful application of the process to the production of the foot for the new lightweight 60-mm mortar. This is produced in 4130 steel, with 1/32-in. fins, and no machining is required.

Watervliet Arsenal has developed a technique for coping with the occasional, unpredictable occurrence of decarburized spots on the surfaces of castings produced by the investment method. Their presence is hard to detect. The problem has been solved by subjecting all such castings to heat treatment in a carburizing atmosphere which remedies carbon deficiencies.

Shell molding also is being used on an increasing scale at Watervliet to replace forged and machined gun parts with castings which require little machining or none at all. A recent example is a breech block closing spring cylinder. Cost of the finished part by shell molding is $8.67; when the piece was produced as a solid forging and machined the cost averaged $180 per piece.

WAGE INCREASES of 30 cents per hour have been granted by some of the leading ferrous foundries in this area. Hikes in the prices of castings may be necessary to account for higher costs but there is little indication of this move as yet.

Activity of some foundries is reflecting holiday lulls in casting buying. Output of iron foundries is down 20 per cent from last month's levels. The seasonal drop is not thought to be alarming as customers' buying habits have not changed much. Overall business, however, is not as active for these foundries as it was last spring.

Despite seasonal influences activity of steel foundries is sustained. The fact that business is strong for steel foundries was a little surprising to trade experts who usually look for depressed buying schedules at midsummer. Backlogs and work schedules for these foundries are about the same as in first quarter.

So far there has been no effect of defense cutbacks or rescheduling on foundries' order books. The level of defense work seems to vary according to type of foundries. Iron foundries have about 20 per cent of their orders in defense or defense-supporting production and the percentage has been stable. About 50-60 per cent of production of steel foundries is for defense—and the percentage is increasing.

An interesting application for steel castings is developing in the rapidly expanding missile industry. Opportunities to bid on steel castings for rocket launchers and other ordnance items are increasing. These parts are usually close tolerance; as close as 1/32-in.

FOUNDRY operations in and around Detroit are just about normal. Both captive automotive foundries and jobbing shops are working a normal five-day week, two-shift operations. Backlogs of orders in many cases are relatively low, yet none reports a lack of work to keep going at a satisfactory rate. Foundries supplying castings for machine tools and other nonautomotive products also report normal operations.

Materials generally are in good supply with the exception of nickel which users report no worse than in the immediate past. Labor is still uncomfortably scarce, but no cases of lost production due to labor shortage are reported. Foundrymen are eyeing the auto production goals carefully, however, for with supply and demand in almost perfect balance right now any slackening of auto output will mean lower operations for many foundries in the area.

WHILE still reflecting summer seasonal influences, district foundry operations are picking up somewhat. A number of foundries virtually have wound up their vacation programs, although others still have a way to go in this regard. Actually, vacations will continue to be a factor in the overall picture through August, to say nothing of warm weather.

Gray iron shops have backlogs averaging a month or more. Backlogs of most jobbing shops range three to four weeks, with those of plants engaged more consistently in heavy work being somewhat more extended. While machine tools business is less active, this has not been reflected to any particular degree at the foundry level around here.

Steel foundries are working off backlogs rather rapidly, due to an appreciable lag in defense work. However, current operations are still high, with due allowances for vacations and warm weather. Steel casting backlogs are not running more than eight to ten weeks. Malleable shops are moderately active, operating at around five days a week, with backlogs averaging around four weeks.

Brass and bronze shops report business as spotty. Ship work has about reached the "famine stage" with most of them and there is a decline in various government specifications. Meter requirements, on the other hand, are holding up very well—in fact, much better than anticipated at the beginning of this year. Aluminum and magnesium shops are very busy, reflecting primarily the continued activity in aircraft work.

Management Group Holds Chicago Clinic Nov. 4-6

Industrial Management Society will sponsor its seventeenth annual Time and Motion Study and Management Clinic Nov. 4-6 at Sheraton Hotel, Chicago. United States industrial leaders will discuss developments in time study, motion economy, job evaluation, methods, plant layout, materials handling and human relations.

Feature of the evening will be the annual Methods Improvement Contest, with awards to companies and colleges for outstanding advances in industrial engineering techniques and applications. Ralph H. Landes, Western Electric Co., is general chairman of the clinic. Inquiries may be addressed to the society at 35 East Wacker Dr., Chicago 1.

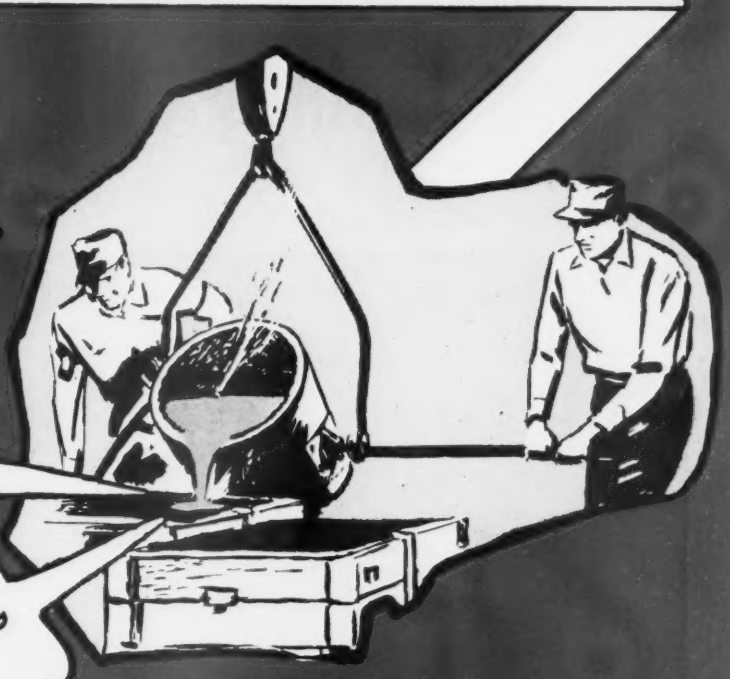
Book Review

ASTM Standards on Copper and Copper Alloys, paper, 542 pages, 6 x 9 in., published by the American Society for Testing Materials, 1916 Race St., Philadelphia 3. Price $5.

This 1953 edition contains in their latest form 115 widely used ASTM standards on copper, copper alloy, and copper covered steel electrical conductors; nonferrous metals; plate, sheet, strip, and rolled bar; rod, bar and shapes; wire; pipe and tube; ingot; sand and die castings; filler metal; and methods of test for copper and copper alloys. Specifications on slab zinc, pig lead, nickel, silicon, electrolytic cathode copper also are included as well as test methods for expansion, mercurous nitrate, resistivity, preparation of micrographs, tension, hardness, sampling, and grain size evaluation.

IN THE INTEREST OF REDUCED CASTING REJECTS AND BETTER PROFIT

Make Comparative Test Castings



1st. POUR CASTINGS WITH MOLTEN IRON AS IT NOW COMES FROM YOUR CUPOLA.

2nd. POUR AGAIN IN DUPLICATE MOLDS AFTER YOU HAVE BEEN USING FAMOUS CORNELL CUPOLA FLUX.

NOTE: It is very important that you use Famous Cornell Cupola Flux not less than 30 days, or better still, six weeks before passing judgment on it. This length of time is required to get a report from the machine shop and ascertain the full savings through reduced casting rejects, reduced cupola maintenance through cleaner drops and longer lasting lining—and to get your return gates and sprues that have been fluxed, back into cupola.

PRE-MEASURED SCORED BRICK FORM takes but a few seconds to use, enables greater accuracy in fluxing molten iron and prevents waste.

Write for Bulletin 46-B

These are the findings

. . . OF HUNDREDS OF LEADING GRAY IRON FOUNDRIES, AND MALLEABLE FOUNDRIES WITH CUPOLAS, WHERE IRON IS CLEANSED AND CONDITIONED BY

Famous CORNELL CUPOLA FLUX

- **Iron is clean, hotter and more fluid.**
- **Sulphur is greatly reduced.**
- **Slag is kept fluid.**
- **Castings are cleaner and sounder.**
- **Machining is easier and smoother.**
- **Cupolas are kept cleaner, minimizing maintenance cost.**

ATTENTION, CANADIAN FOUNDRIES: George F. Pettinos (Canada) Limited, Hamilton, Ontario, has been appointed sole Famous Cornell Flux representative for Ontario and Manitoba.

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BRASS FLUX

FAMOUS CORNELL BRASS FLUX cleanses molten brass even when the dirtiest brass turnings or sweepings are used. You pour clean, strong castings which withstand high pressure tests and take a beautiful finish. The use of this flux saves considerable tin and other metals, and keeps crucible and furnace linings cleaner, adds to lining life and reduces maintenance.

ALUMINUM FLUX

FAMOUS CORNELL ALUMINUM FLUX cleanses molten aluminum so that you pour clean, tough castings. No spongy or porous spots even when more scrap is used. Thinner yet stronger sections can be poured. Castings take a higher polish. Exclusive formula reduces obnoxious gases, improves working conditions.

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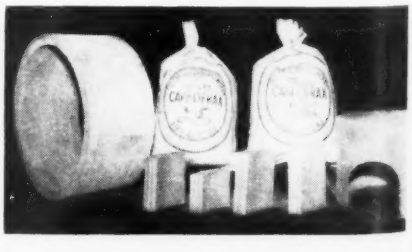
Best Linings Obtainable—Anywhere"

says Chicago non-ferrous foundry

The Christensen & Olsen Foundry Co., specializing in copper-base castings, has 10 crucible furnaces. Six are of the pit type and four are tilters. The pit type is lined with one-piece rings, and in the tilters they use segmental tile linings. Both are made of CARBOFRAX® silicon carbide refractories, and both are backed up with 2½" (or more) of insulating cement—our ALFRAX® castable aluminum oxide cement.

In either case, the linings are very easy to install. The rings can be set by hand, without a hoist, then the castable insulating cement is just mixed with water and poured. A complete lining takes only a couple of hours to put in, and is usually good for about two years. The silicon carbide and the aluminum oxide can take punishing temperature conditions that are simply not practical with most other refractories. Moreover, the ALFRAX cement's low heat capacity and low thermal conductivity keep fuel costs to a minimum. In short, they go in faster, stay in longer, and give faster, more uniform heating than other linings.

This foundry has been using linings by CARBORUNDUM for over 15 years. They state simply that they have yet to find better materials for non-ferrous furnaces. We'd like to interest you, too. We make lining materials to fit your every need—rings, ring segments and cements. For details address: Dept. A-83, Refractories Division, The Carborundum Co., Perth Amboy, New Jersey.



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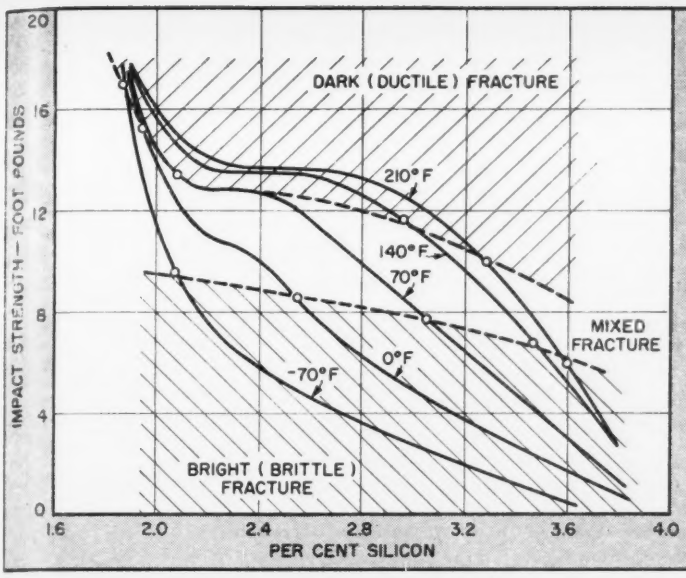

Fig. 1—Effect of silicon on the impact strength and the type of fracture at various temperatures. Adjusted for an 0.036 per cent phosphorus content

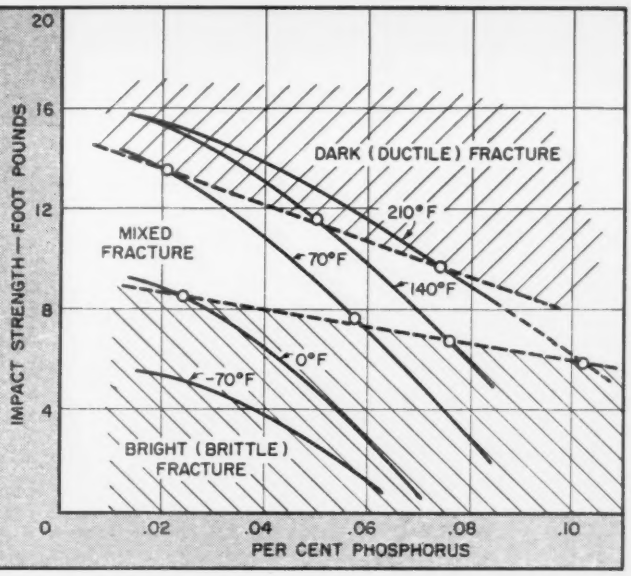

Fig. 2—Effect of phosphorus on impact strength and the type of fracture at various temperatures. Adjusted for a silicon content of 2.65 per cent

ASTM Considers Low Temperature Impact

Properties of Gray and Nodular Cast Irons

By EDWIN BREMER
Metallurgical Editor

IMPACT studies on gray and nodular cast irons at room and subnormal temperatures were of particular interest to foundrymen at the annual meeting of the American Society for Testing Materials held at Atlantic City June 28 to July 3. R. W. Kraft, American Brake Shoe Co., Mahwah, N. J., described an investigation of "Impact Properties of Ferritic Ductile Iron" using 0.505-in. diameter bars machined from 1-in. Y-block castings. He reported that no sharp transition temperature was detected, and that, as the temperature is lowered to minus 100° F or the Si or P content increased, the impact strength falls off relatively slowly with a gradual transition from ductile to brittle fractures.

Maximum Si content permitting ductile fracture in a low P iron at room temperature is 2.4 per cent, but a completely brittle fracture does not occur until Si is increased to 3.0 per cent. Other relationships determined for Si contents from 1.8 to 3.9 per cent, for P contents up to 0.08 per cent and for temperatures from minus 70° F up to 210° F are shown in Figs. 1 and 2.

G. N. J. Gilbert, British Cast Iron Research Association, Birmingham, England, prepared a paper on "Ductile and Brittle Failure in Ferritic Nodular Irons" which was abstracted by Dr. James T. MacKenzie, American Cast Iron Pipe Co., Birmingham, Ala. The author pointed out that impact studies on annealed ferritic nodular irons revealed that at room temperature those materials can fail in a ductile manner with a relatively high impact value or in a brittle manner with relatively low impact value, depending upon composition and treatment.

Such changes are not accompanied by similar changes in ductility as shown by the normal tensile test. Impact transition curves for nodular irons of various Si and P contents show that those elements raise the temperature of transition from brittle to ductile failure. When Si content exceeds about 2.4 per cent in low P iron the material becomes brittle in the notched impact test at room temperature. By increasing P content from 0.08 to 0.16 per cent in a 2 per cent Si iron, the material becomes notch brittle at room temperature. From those data the author concluded that nodular iron castings likely to be subjected to impact conditions in service should have the lowest possible Si and P contents consistent with other requirements.

JAMES T. MacKENZIE
ASTM Award of Merit

Another paper on "Low Temperature Properties of Cast Irons" by the same author, which was briefed by Thomas E. Eagan, Cooper-Bessemer Corp., Grove City, Pa., pointed out that mechanical properties of acicular and austenitic materials are complicated by the austenite to martensite transformation which occurs at low temperatures. In acicular materials the change occurs between minus 54° F and minus 83° F while in austenitic materials it varies widely with chemical composition.

Impact values of acicular materials decrease up to 48 per cent at minus 148° F and show a sudden fall when the phase change occurs. Increases in tensile strength up to 18 per cent were found. Impact values of austenitic materials in which part of the Ni was replaced by Cu, increase at low

(Concluded on page 162)

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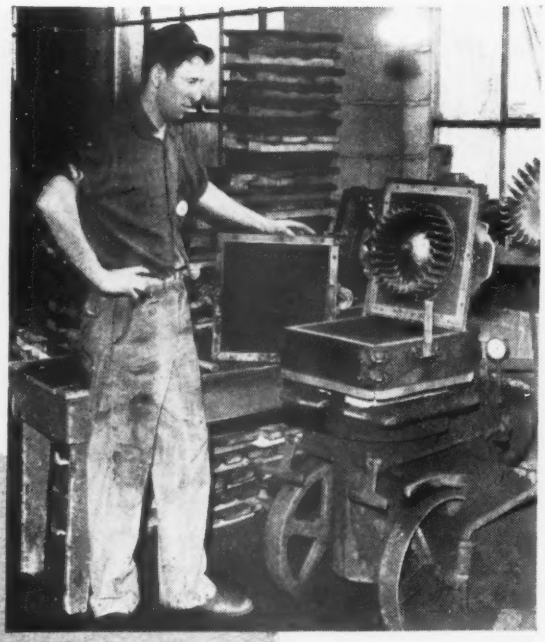
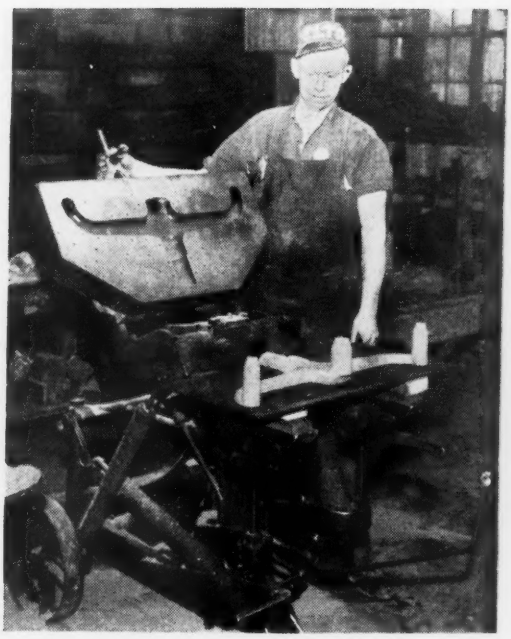
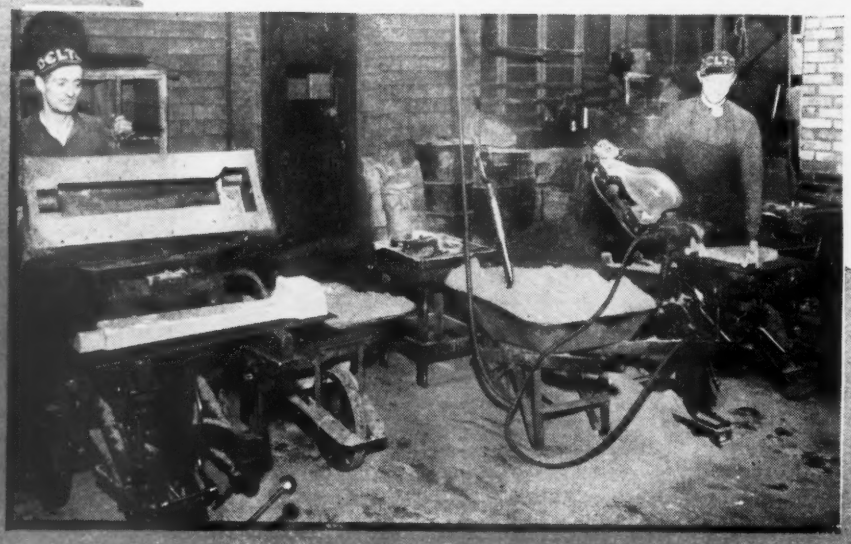
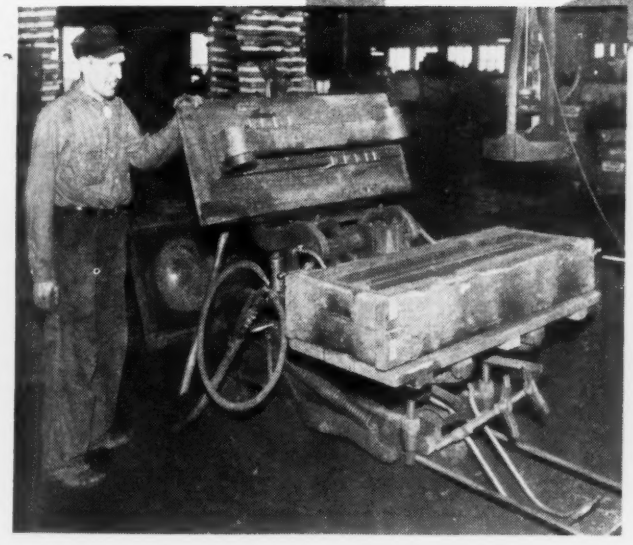
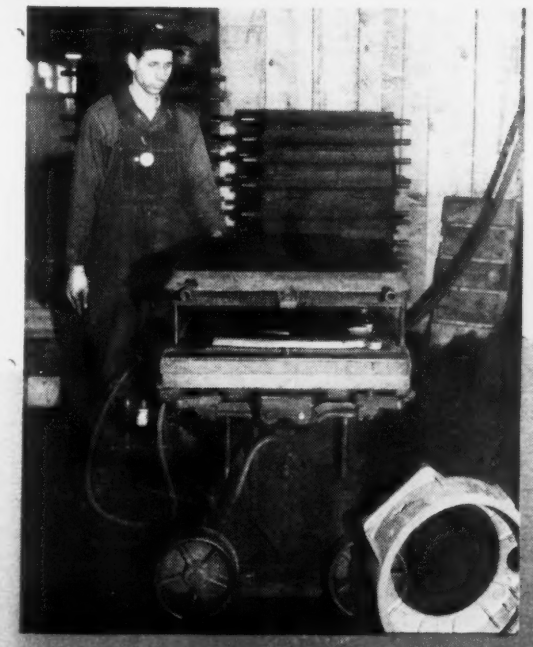
Photographs taken at J. E. Gilson Company, Port Washington, Wisconsin











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temperatures providing the phase change temperature is not exceeded. Substantial increases in tensile strength were obtained in transformed austenitic materials.

James S. Vanick, International Nickel Co., New York, discussed "Low Temperature Toughness of Flake and Spheroidal Graphite Cast Iron" based on an investigation in which 1.2-in. diam bars were broken on an Izod machine at room temperature, minus 100° F, and minus 300° F. Test values on pearlitic, acicular and austenitic irons indicate a decrease of 10 to 20 per cent for pearlitic irons cooled to minus 100° F, and 50 per cent when cooled to minus 300° F. Austenitic irons possess a higher order of toughness at room temperature and retain a greater percentage than do pearlitic irons at temperatures down to minus 300° F. Spheroidal graphite irons also retain more toughness than flake graphite types down to minus 100° F. For temperatures down to minus 300° F the high strength acicular irons of ASTM grades Nos. 50 and 60, annealed or tempered to a hardness below 220 brinell to eliminate the unstable phase, appear to be useful as replacements in applications for up to No. 40 pearlitic irons where those are satisfactory for room-temperature service.

At a luncheon held Tuesday noon Dr. James T. MacKenzie, American Cast Iron Pipe Co., Birmingham, Ala., and Jerome Strauss, Vanadium Corp. of America, New York, along with eight other members of the society, were presented the ASTM Award of Merit in recognition of distinguished service to the organization.

Announcement was made of the newly elected officers and directors of the society which included president, L. C. Beard, Socony-Vacuum Oil Co. Inc., New York; and vice president, C. H. Fellows, Detroit Edison Co., Detroit. Directors are N. A. Fowler, General Box Co., Des Plaines, Ill.; R. T. Kropf, Belding Hemingway Corticelli, New York; T. F. Olt, Armco Steel Corp., Middletown, O.; J. R. Townsend, Sandia Corp., Albuquerque, N. M., and K. B. Woods, Purdue University, Lafayette, Ind.

Second Gillett Memorial lecture was presented by Jerome Strauss, Vanadium Corp. of America, New York, and dealt with "Micrometallurgy" which pertained to the applications of small amounts of elements or combinations of elements to metals and alloys to bring about marked improvements in the latter; for example addition of boron to steel, and cerium and magnesium to cast iron.

Annual Edgar Marburg lecture was given by Frederick D. Rossini, Carnegie Institute of Technology, Pittsburgh, who described "An Excursion into Petroleum Chemistry".

Committee A-3 on Cast Iron recommended that a new tentative "Methods of Chill Testing of Cast Iron" be published, and that "Tentative Specification for Gray Iron Castings for Pressure Containing Parts for Temperatures up to 650 F" (A 278-61T), and "Tentative Specification for Gray Iron Castings for Elevated Temperatures for Non-pressure Containing Parts" (A 318-48T) be adopted as standards.

Committee A-1 on Steel recommended revisions in "Tentative Specification for Carbon-steel Castings Suitable for Fusion Welding for High-temperature Service" (A 216-47T) and "Tentative Specification for Alloy Steel Castings for Pressure Containing Parts Suitable for High-temperature Service" (A 217-49T). In the latter another alloy steel was added to the list of seven—containing 1.0 to 1.5 per cent Cr, 0.40 to 0.60 per cent Mo, and 0.15 to 0.25 per cent V.

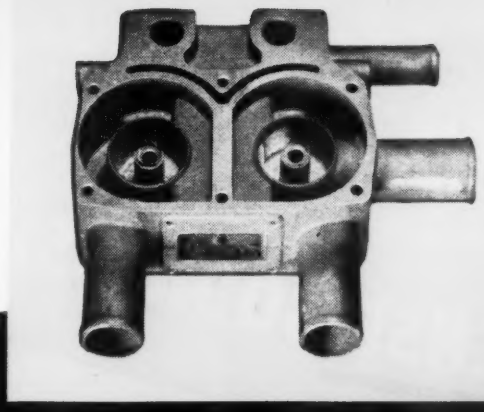
Committee B-7 on Light Metals and Alloys, Cast and Wrought recommended revisions in "Tentative Specification Magnesium-base Alloy Sand Castings" (B 80-51T), and "Codification of Light Metals and Alloys, Cast and Wrought" (B 275-52T), and adoption of "Tentative Specification for Aluminum-base Alloys in Ingot Form for Sand Castings, Die Castings and Permanent Mold Castings" (B 179-51T) as a standard.

Committee A-7 on Malleable Iron Castings recommended that "Tentative Specification for Malleable Iron Flanges, Pipe Fittings and Valve Parts for Railroad, Marine and Other Heavy Duty Service" (A 338-51T) be continued as a tentative without revision.

Committee E-7 on Non-destructive Testing reported that the Bureau of Aeronautics has offered its set of reference radiographs for inspection of aluminum and magnesium castings to the society, and recommended that the set be published as "Tentative Reference Radiographs of Aluminum and Magnesium Castings". The committee also recommended that "Tentative Industrial Terminology for Use in Radiographic Inspection of Castings and Weldments" (E 52-49T) be continued without revision.

NO ACCIDENTS: For operating without reportable accidents during 1952, Zenith Foundry Co., Milwaukee, was presented with a safety award by the Wisconsin Industrial Commission. O. T. Nelson, left, director of the Industrial Commission's Department of Safety and Sanitation, made the presentation, which was accepted for the company by Secretary-treasurer George Tisdale, right. Between them are William R. Pritchard, personnel manager, second from the left, who is in charge of the company's safety program, and Ben Drewes, foundry manager. Zenith Foundry had a similar record in 1948 (*Milwaukee Sentinel* photo)

Booz, Allen & Hamilton, management consultants, have opened an office in Cleveland at 629 Euclid Ave. Resident partners are Edwin L. Morris, F. Newton Parks and Lester E. Burmeister.



This heart must pulse or the Plane's in trouble—

Radiograph of de-icer pump casting

so it's checked by RADIOGRAPHY

ICE can down a plane as sure as flak. So it's kept from wing-edge and prop by the throbs of this pulsating heart.

Easy to see the importance of this tiny unit—and why its castings must be sound. To make certain, each part is x-rayed. This way weakness cannot lurk in a hidden flaw.

What's more—a part so finely finished calls for careful machining, which would be wasted if x-rays did not first reject any unsatisfactory castings.

It's another example of why more and more suppliers of castings use radiography. It speeds the establishment of proper casting technics and lets you be sure only sound castings are delivered.

If you'd like to know how radiography can improve your operations, get in touch with your x-ray dealer. Or, if you like, write us for a free copy of "Radiography as a Foundry Tool."

EASTMAN KODAK COMPANY
X-ray Division, Rochester 4, N. Y.

Radiography...
another important function of photography

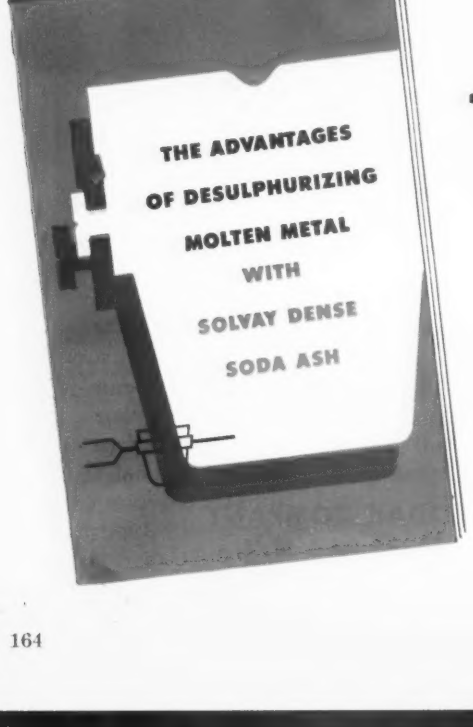
Kodak
TRADE-MARK

Desulphurization with SOLVAY DENSE SODA ASH

✓ Offers Many Advantages

✓ Costs Less

SOLVAY DENSE SODA ASH is especially effective for desulphurization. This 100% active material helps produce better, more fluid metal . . . and gives you these other advantages: it's free-flowing; the small grains melt very rapidly, allowing faster, more uniform dispersion; and it's easily added by means of simple equipment. The use of Solvay Dense Soda Ash is a flexible one—you use only as much as you need. And remember, Solvay Dense Soda Ash is the *low cost* form of desulphurization!



Further Information Contained in Valuable Book—Available on Request

"The Advantages of Desulphurizing Molten Metal with Solvay Dense Soda Ash" has been published by Solvay for the benefit of the foundryman. It contains important information on the advantages you can gain by desulphurizing with Solvay Dense Soda Ash. It also explains what type of equipment is needed and how to obtain it. This book is available free—on request—by simply writing to Dept. F-8. Be sure to get your copy.

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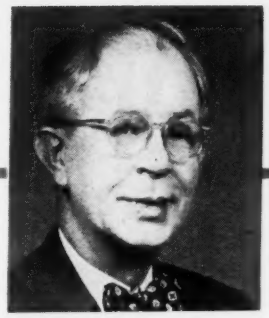


Man-to-Man

By RALPH L. LEE

Competition, the Life of Trade?

"The best place for competition is on the inside, a race between what we should and can do and what we actually do"

I AM beginning to wonder if competition is nearly as much the life of trade as it's cracked up to be. Most of the outfits I find to be way out in front (competitively speaking) seem to be so busy licking their own internal problems—finding out new things and developing the new things they have found—that they don't seem able to find time to keep tabs on what the other fellow is up to.

There's no doubt, of course, that every once in a while competition can yank us up on our toes, especially if we've been sliding along on our fannies. But in the main it seems to me that the real competition that needs licking is on the inside—that everlasting fight between the will to do what we know we should and can do and that old *manana* in most of us that causes us to put off until tomorrow what we know darned well we should do today.

I've been looking back over the log of a number of fine concerns who have left a trail of outstanding accomplishments behind them, and without stretching it one bit I don't think I can recall one single case where high pressure, teeth gritting, knockdown dragout determination to lick the britches off some lowdown competitor has been responsible for any of these outstanding accomplishments. I do recall, however, any number of cases where fights to the death practically bankrupted both contestants.

The trouble with keeping up with the Joneses seems to be that by the time a guy finds out through the grapevine what the Joneses are dishing up and sets up the machinery for copying them or going them one better, they come out with something else, leaving him exactly in the same relative position where he started.

Competition didn't have one darned thing to do with the development of Ethyl gasoline for example; it came as a by-product of trying to find out what in the heck makes engines knock. Duco paint was the result of trying to find some way of opening the bottleneck in the early automobile paint shops. The old style flat radiator fan belt, usually bought by the half-dozen, led to the development of the V-belt, a boon to mankind if there ever was one. The diesel locomotive and modern power plant was not born in competitive strife; it came as a result of trying to find out what a diesel would like to be if it had its own way. Ductile tungsten, beryllium copper, Permaloy, Alnico, Freon, shell molding, high-frequency core baking and every other significant development in electronics, mechanics and what-have-you came about as far as I can see from internal competition—not from watching the other fellow.

No sir! copying the other fellow, or trying to get ahead of him seems to be a rather hazardous business. It's always endangered by a terrific time lag. The diabolical thing about it is that we are apt to copy the wrong thing—in fact, frequently the very thing he is on the point of abandoning.

"Boss Ket" (Dr. C. F. Kettering of General Motors and of worldwide fame) has been saying just about as long as I've known him that research is "the job of finding out what we're going to do when we can't keep on doing what we're doing now." This brand of research is, to my way of thinking, the best competition insurance anyone can have. Stripped of the inference that research is synonymous with huge budgets, high falutin' instruments, equipment, test tubes, slide rules, scientific lingo and everything else we haven't got, Boss Ket's research is within reach of everyone from the tiniest little peewee foundry (Lee Hobby Foundry) to the very biggest. And research need not be confined to metallurgy, equipment or processes! It's equally applicable and profitable when applied to markets, sales, advertising, credit, finance, management, supervision, material handling, inventories, receiving, shipping, safety and public relations.

I don't see how anyone, no matter who he is, can possibly do his job conscientiously without uncovering a lot of questions that need answering and can be answered if he has the will to do it.

Some people (usually the busiest ones, with the greatest responsibilities) find the time, some way, to get the answers, or at least most of them, and I'd be willing to bet that whether they are individuals or organizations, these folks don't have to be very much concerned with competition.

But, on the other hand, those who unearth just as many questions but kid themselves into thinking that they don't have the time to get the answers or are so worn out with the daily grind that they don't have the strength to look for them—they, I'll bet you, are the very ones who are righteously indignant over the unprincipled pups who give them so much cutthroat competition. At this point Mother (that's Mrs. Lee, my home superintendent, vice president in charge) suggests I tuck in here a quip she read somewhere: "It takes a mighty conscientious person to tell the difference between being tired and just plain lazy."

It just occurs to me that all we've said here about competition in business applies equally as well to the careers of individuals. Some people spend so much time fighting for their rights that they have little time left for cashing in on the rights they have.

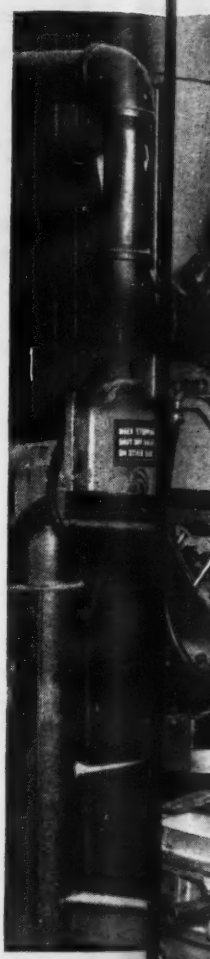
Some years ago a young friend of mine came to my office, closed the door and asked to talk to me confidentially. After doubly checking to see that we were alone, he told me that he was going to quit. He was

(*Concluded on page* 168)

NEW! Cope Handler for S

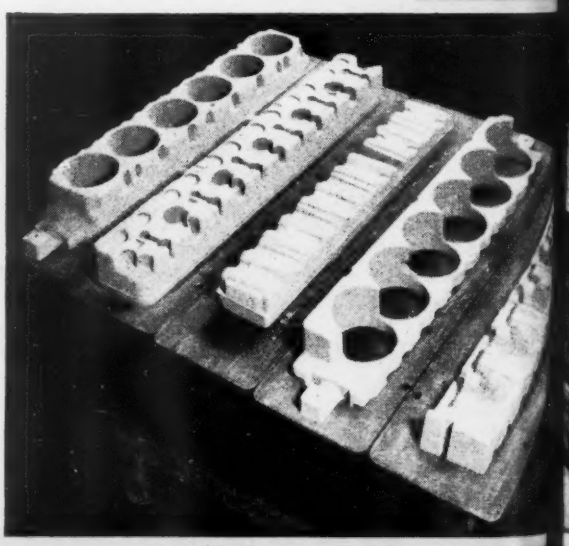
BLOWS 5 DIFFERENT CORE BOXES AT ONE TIME

- **Blows over 300 core boxes per hour . . . automatically**
- **Produces uniform high quality cores**
- **Requires less operator effort and training**



REPETITIVE AUTOMATIC OPERATING CONTROL is adjustable to suit a wide range of individual jobs and types of production. One operator positions drier plates while the other operator racks finished cores. Make-ready stations are available for setting core wires, blowing out boxes and other make-ready operations without limiting production. The floating platen and sub-blow plate, on which the halves of the core box are mounted, are carried in cradle arms on the indexing table. Any core box can be changed over in less than 2 minutes by merely replacing a platen and sub-blow plate.

GET FULL DETAILS. Write The Osborn Manufacturing Company, 5401 Hamilton Ave., Cleveland 14, Ohio.

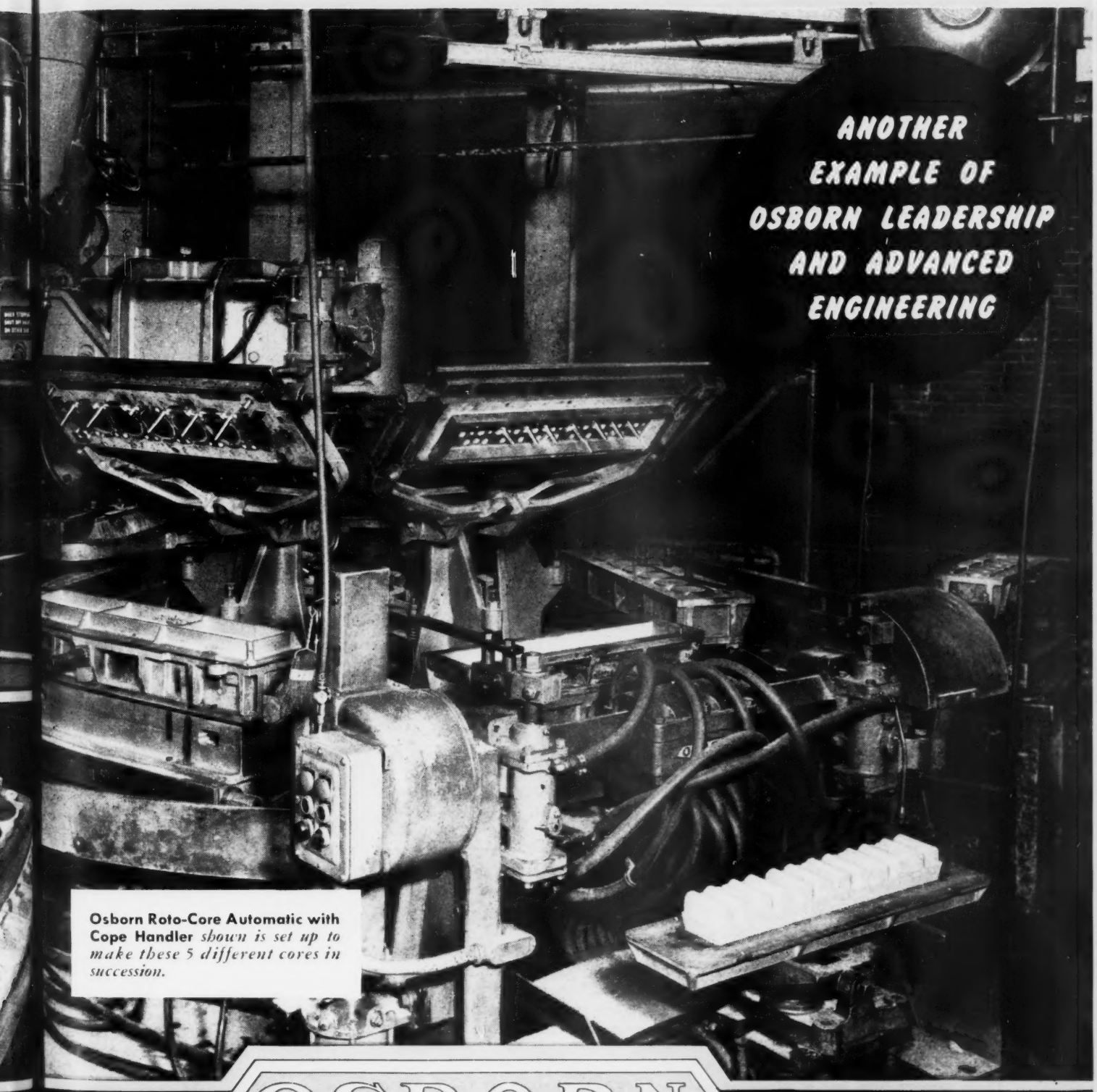


OSBORN ROTO-CORE AUTOMATIC with Cope Handler

- **Blows the cores**
- **Draws the cores**
- **Handles 5 different core boxes simultaneously**

THE OSBORN MANUFACTURING COMPANY
5401 Hamilton Avenue Cleveland 14, Ohio

rsBORN Roto-Core Automatic



Osborn Roto-Core Automatic with Cope Handler *shown is set up to make these 5 different cores in succession.*

OSBORN®

MOLDING MACHINES

CORE BLOWING MACHINES

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

(*Concluded from page* 165)

convinced that the boss had it in for him—in fact, that he was jealous of his ability.

"What makes you think that?" I asked.

"I've tried to give him an idea that would revolutionize our whole setup, and all he does is to give me the old brushoff," my friend replied.

"By the way!" I asked "how's the work he wants you to do coming along?"

"Oh! So-so. Why do you ask?"

"Now remember," I said, "you have come to me, haven't you? I'm not butting in, am I? And I hope you're not going to get miffed at what I'm going to say. But every time I have passed your desk lately, I have found you with your heels up on it, chewing a lead pencil and staring off into space with a woe-begone look on your face. I happen to know that you've got plenty to do and jobs the boss not only wants you to do, but hired you to do. How you can possibly do these bread and butter jobs while pouting about additional jobs the boss won't let you do is beyond me. I know I couldn't do it. In spite of your outstanding ability, I predict that if you permit this persecution complex you've brought onto yourself from trying to compete with your boss to cripple you as far as your regular work is concerned, you won't have a chance to quit."

I made a pact with him for a month. He agreed that every time the thought of the unfairness of the boss even tried to get into his head, he would lam into one of his routine jobs, or if he had a breathing spell he would take one of the unsolved problems the doing of his regular work had uncovered and go to town on it.

One month later to the day he came into my office with a grin to report a raise. "What about the revolutionary idea the boss wouldn't listen to?" I asked.

"Oh, that," he said a little bit sheepishly. "To tell you the truth, I've been so swamped I forgot all about it."

I honestly think that those who have gotten into the habit of finding in each job they are given to do more than enough room for all of the effort and ingenuity they can muster, never need worry much about competition, where they are headed, how fast they are moving or who is standing in their way. Nine times out of ten their careers turn out a whale of a lot better than any they could have planned for themselves when they started out.

Competion is all right in its place, but the best place for it is on the inside, a race between what we should and can do and what we actually do.

I'm afraid this is a little preachy, but doggone it it's right and true and I just had to get it out of the old system so I can get back up there in the Lee Hobby Foundry. It's a little out of season, but I'm housecleaning—inventorying, too.

OBITUARY

ERNEST L. WATERHOUSE, 60, resident manager, Vassar, Mich., Foundry Division, Eaton Mfg. Co., Cleveland, died recently. In 1921 Mr.

ERNEST L. WATERHOUSE

Waterhouse joined Holley Carburetor Co., Detroit, which was moved to Vassar in 1932 and later became the Eaton permanent mold gray iron foundry.

* * *

Burnett J. Abbott, president and general manager, Gale Mfg. Co., Albion, Mich., died May 25. Mr. Abbott was associated with Chevrolet in Saginaw, Mich., before joining the Gale company in 1935.

* * *

Elmo S. Moncrief, 74, former president, Henry Furnace & Foundry Co., Cleveland, died June 18 in St. Petersburg, Fla., where he lived for the past 5 years. Mr. Moncrief was president of Henry Foundry which made Moncrief furnaces, from 1923 to 1943.

* * *

George J. Zimmerman, 69, former president, Strong, Carlisle & Hammond Co., Cleveland, died May 31. Mr. Zimmerman was a director of Pioneer Alloy Products Co., Cleveland.

* * *

T. Brian Parsons, 45, manager of the permanent mold plant, Aluminum Co., Cleveland, died July 8. Mr. Parsons, a graduate of Cornell University, joined Alcoa's New Kensington, Pa., plant in 1933, later serving in sales and purchasing in Pittsburgh. He supervised building of company plants in Oregon and Pennsylvania and held executive positions in company headquarters in Pittsburgh until 1948 when he went to Cleveland.

* * *

F. Leslie Howard, 64, treasurer, Eastern Malleable Iron Co., Wilmington, Del., died June 11 following a long illness.

* * *

John R. Hurley, 45, president, Thor Corp., Chicago, and vice president of its subsidiary, Meadows Corp., Bloomington, Ill., died June 21. His father founded the Thor company.

* * *

Harold E. Russell, 53, assistant manager of the industrial sales division, A. Schrader's Son, Division of Scovill Mfg. Co., Brooklyn, N. Y., died recently. He joined the company in 1937.

* * *

Theodore A. Weager, 67, until his retirement two years ago Cleveland manager, Buffalo Forge Co., Buffalo, died June 18. Mr. Weager opened the Cleveland office in 1916.

* * *

Robert F. Holmes, 49, for 7 years manager of sales, Universal Engineering Co., Frankenmuth, Mich., died May 26 while on a sales trip to Ken-

ROBERT F. HOLMES

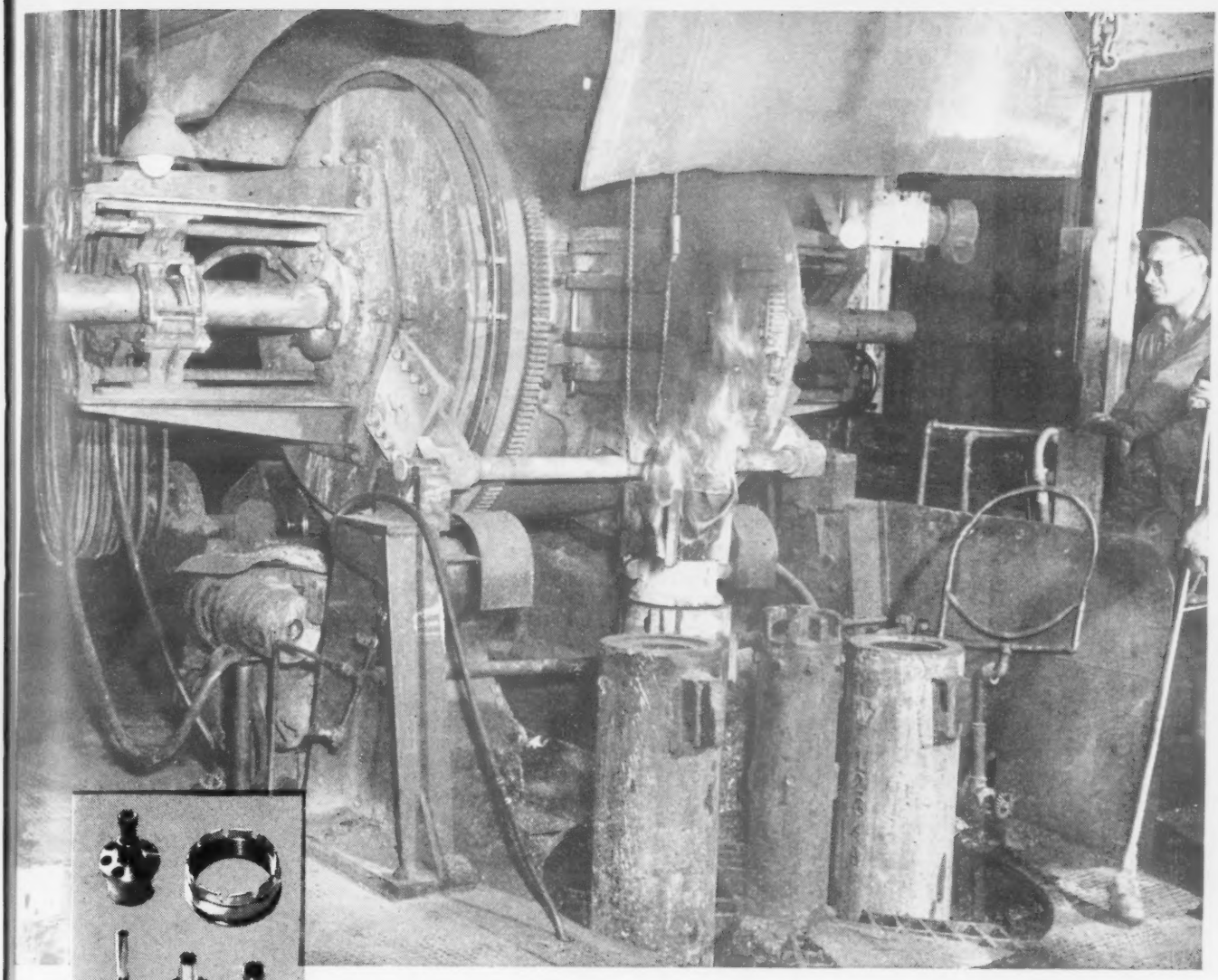
osha, Wis. Prior to joining Universal Engineering Mr. Holmes was associated with Sheffield Corp. and Frigidaire Division of GMC in Dayton, O.

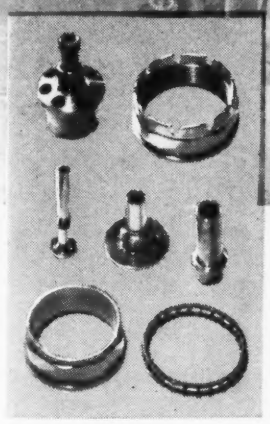
* * *

Henry Blumenstein, 83, for 50 years a foreman in the foundry, American Ship Building Co., Cleveland, died June 23. He retired three years ago.

* * *

Frederick A. Weiss, 84, former vice president, Milwaukee Steel Foundry Co., now a division of Grede Foundries Inc., Milwaukee, died June 27.





Some of Mueller Brass Company's products made from DEF-melted alloys.

11 tons of copper alloy billets from this furnace every 24 hours

In this nose-tilting, 1000-lb. capacity Detroit Rocking Electric Furnace at Mueller Brass Company, alloys are changed from heat to heat. Yet it melts and pours about 11 tons of billets every 24 hours.

It's a good example of the versatility and fast-melting characteristics of Detroit Rocking Electric Furnaces. Each heat produces a billet of precisely controlled analysis. Rocking action of the furnace makes most efficient use of the heat from the indirect arc, guarantees homogeneity of metal. High quality metal means fewer rejects, better products.

Detroit Electric Furnaces, in capacities from 10 to 8000 lbs., are outstanding producers for both ferrous and non-ferrous metals. Outline your requirements and we'll give you complete information to bring new efficiency to your metal melting. Write today!

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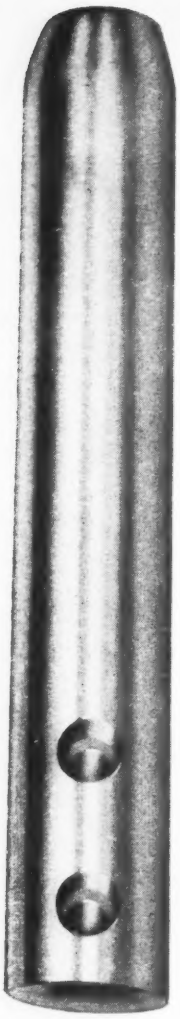
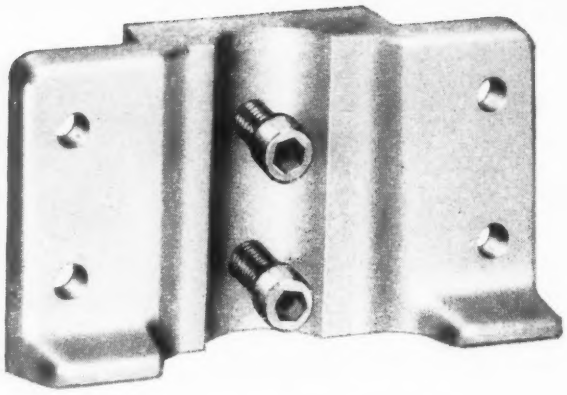


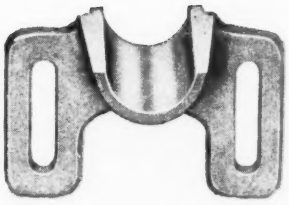
ADAMS 1" ROUND PIN

Side Mounting—Reversible
Countersunk Both Sides
Hardened—Ground
Hard Chrome Plated



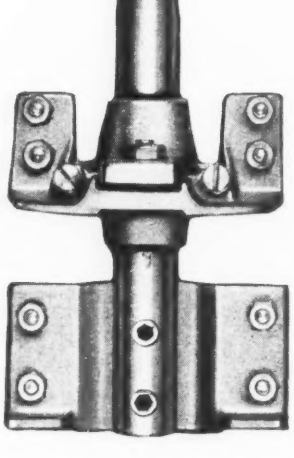
ADAMS 1" ROUND PIN BASE
(Cast Aluminum)

For Side Mounted Reversible Pins
Pins Mounted with Allen
Hollow Head Set Screws



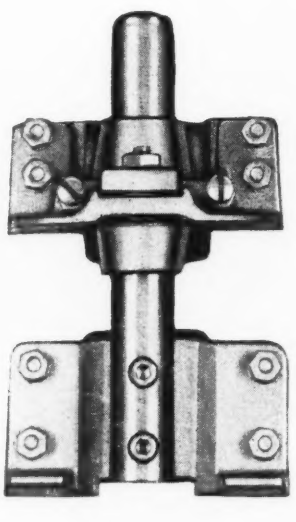
ADAMS MATCH PLATE EAR

Extra Long for
1" Diameter Pins
(Side Mounted)



ADAMS 1" ROUND PIN AND EAR
(For Cherry Flasks)

Side Mounting Permits Use of
Extra Long Match Plate Ear As-
suring Expert Deep Pattern Draw



ADAMS 1" ROUND PIN AND EAR
(For Aluminum Flasks)

Side Mounting Assures Rigidity
of Pin. Adds Extra Life Because
of Simple Reversible Feature

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Adams Quality and Precision remains constant through rigid specifications governing the manufacture of all New Flask Equipment or Flask Trimmings to be used for Part Replacement. Write us today. Your equipment problems can be solved by Adams.

The ADAMS Company

ESTABLISHED 1883

MOLDING MACHINES and FLASK EQUIPMENT

DUBUQUE, IOWA, U.S.A.

Industry Briefs

ALLOYS & Products Inc., 1101 Oak Point Ave., New York 59, has embarked on a program of volume production of titanium-aluminum alloys. Principal product will be the 5 per cent titanium alloy used by producers of primary aluminum and by aluminum foundries. Melting capacity of 2½ million lb per year has been installed.

* * *

Clark Equipment Co., Buchanan, Mich., has acquired all the capital stock of Ross Carrier Co., Benton Harbor, Mich., and of Michigan Power Shovel Co., a Ross Carrier subsidiary. Production and administration of the Ross and Michigan companies will be integrated with the Clark organization. Ross' manufacturing operations in their present locations will be continued.

* * *

The Wisconsin Manufacturers Association, in co-operation with the Wisconsin Industrial Commission, is sponsoring an exhibit on industrial apprenticeships, part of which will demonstrate actual foundry work, at the Wisconsin State Fair, Aug. 22-30. Exhibit space will be divided into three sections showing patternmaking operations; molding, melting and pouring, and machine shop work on castings produced. Apprentices in each of the trades involved will do the demonstrating. The exhibit will be in the Wisconsin at Work Exposition Building, State Fair Grounds.

* * *

Air Products Inc. is completing a $200,000 expansion and shop rearrangement program at its Emmaus and Allentown, Pa., plants. Aimed at increased production efficiency, the program includes construction of the first of six units in a new laboratory on an Allentown site where the firm plans to consolidate all its activities, including manufacturing.

* * *

U. S. Engineering Corp., 6208 North 38th St., Milwaukee, has changed its name to Jorgenson Conveyors Inc. and plans construction of a new plant which will triple existing production capacity. Expansion plans also call for opening sales offices in the Winston-Salem, N. C., and Detroit areas. Fred I. Johnson has been appointed sales engineer for Illinois and northern Indiana.

* * *

Bryant Industrial Division, Affiliated Gas Equipment Inc., Cleveland, has been purchased by the newly formed Bryant Industrial Products Corp., headed by Robert Buck. Located at 17700 Miles Ave., Cleveland, the new firm will specialize in the design, production and marketing of industrial gas combustion equipment. All key personnel of the division are reported to have joined the new organization.

* * *

Alloy Rods Co., York, Pa., is constructing a new plant in El Segundo, Los Angeles county, Calif., to be known as the Pacific Coast Division of Alloy Rods Co. The new facility will produce alloy arc welding electrodes. Scheduled for full operation by Oct. 1, it will be under the supervision of George M. Hohmann, now production manager of the York plant.

* * *

Hyster Co., 2902 N.E. Clacamas St., Portland, Ore., is marking its 25th year in the materials handling industry with the dedication of a new manufacturing plant at Nijmegen, the Netherlands. Situated on a 4½-acre site, the new European plant will produce several models of the company's lift trucks.

* * *

Detroit Flame Hardening Co. has opened a plant at 17644 Mt. Elliott, Detroit, that is designed, built and equipped solely for applying precision flame hardening and induction hardening to ferrous metals. The new facility has almost double the capacity of the firm's Highland Park plant, which will be devoted exclusively to research and development projects in the future.

* * *

H. K. Porter Co., Pittsburgh, has acquired a controlling interest in A. Leschen & Sons Rope Co., St. Louis, which will continue operations as Leschen Wire Rope Co., Division of H. K. Porter Co., under the direction of D. W. Vernon, vice president and general manager.

* * *

Griswold Mfg. Co., Erie, Pa., recently opened an office at Room 3038, Grand Central Terminal Bldg., 70 East 45th St., New York.

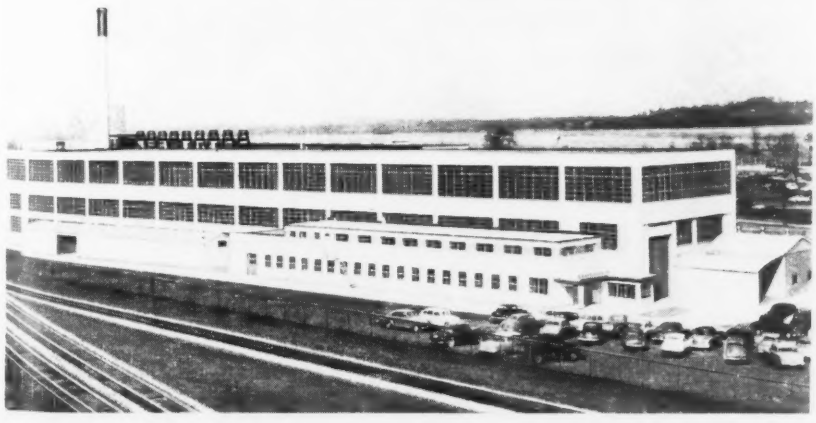
* * *

George A. Knowles Foundry Inc., Niagara Falls, N. Y., has changed its name to Knowles Foundry & Machine Co., Inc., and its capital stock from 200 shares of no par value to $250,000 capitalization.

* * *

Ruco Sales Corp., 3415 South Lawndale Ave., Chicago 23, has been formed to offer shell molding consulting service and to distribute shell molding machines, parts and accessories. William L. Rudin is president, Bernard R. Cohen, vice president, and Benjamin Robert Cohen,

(*Concluded on page* 174)



MOVING DAY: N. Ransohoff Inc., producer of equipment for surface treatment of metals, moved recently from Elmwood, O., a Cincinnati suburb, to nearby Hamilton to obtain enlarged production facilities and to consolidate administrative, engineering and sales departments. Principal component of the new plant is the pillarless fabrication shop, in which traveling cranes serve the shop area and trucks and railroad cars can unload. The company did not lose any key personnel in the transfer

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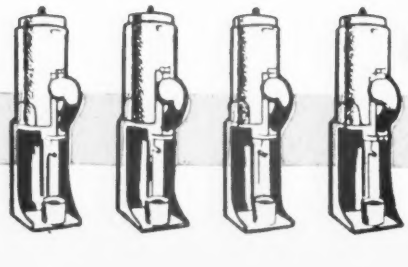

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Pre-mixed refractory for patching cupolas by air placement. Eliminates human equation. Produces uniform, dense patch of maximum slag resistance at lower cost.

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Strong, refractory, durable and economical. Unusually high colloidal content. Since 1923, the standard of comparison for refractory bond clays.

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Extremely high dry and hot strength. Thermoplastic, gives toughness at high temperatures. Helps eliminate washing and scabbing.

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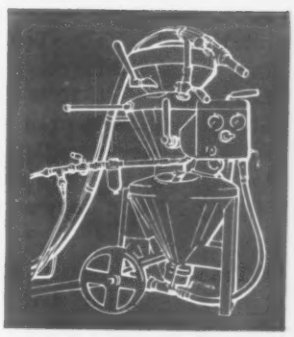

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(*Concluded from page* 171)

secretary-treasurer. Among other products the company will handle Shalco Shell molding machines developed at Stanford University.

* * *

Electro Refractories & Abrasives Corp., Buffalo, is resuming output of vitrified grinding wheels on a scale four times greater than the company's production at the time it was dropped during World War II so that the firm could concentrate on resin-bonded wheels.

* * *

Carl E. Rowe & Co. have moved to new and enlarged facilities at 500 West National Ave., Milwaukee, in the Industrial Mart Building. The firm of consulting engineers has expanded to cover technical phases of product and machine design, mechanization programs, automatic machine development and other fields.

* * *

Work is progressing on construction of new gray iron foundry for Chevrolet Motor Division, General Motors Corp., at Tonawanda, N. Y. Included in the project are a pattern shop, core room and sand storage, cleaning room, cooling court and an adjoining two-story office building.

* * *

Rife-Loth Corp., Wayneboro, Va., has been sold to a new corporation to be known as Virginia Metalcrafters Inc. President and majority stockholder of the new firm is Charles M. Eckman, 5717 Monument Ave., Richmond, Va. Rife-Loth produces a variety of metal products, including gray iron castings.

* * *

Keller Tool Co., Grand Haven, Mich., manufacturer of air tools, has established Keller-Tool California Inc., a sales subsidiary company, in Los Angeles at 1053 West Seventh St. It will be the parent company's sales and service outlet for Washington, Oregon, California and Arizona. W. A. Nilsson is general manager.

* * *

Tracerlab Inc., 130 High St., Boston, has opened new branch sales offices at 1844 Scranton Rd., East Point (Atlanta), Ga., and at 4614 Prospect Ave., Cleveland. L. Keith Elrod and William A. McCarthy are in charge at Atlanta and Cleveland, respectively.

* * *

Milwaukee Brass Mfg. Co., 127 East Lapham St., Milwaukee, has sold its building to Minnesota Chemical Co., St. Paul, for $55,000. Part of the assets of the firm, which produced brass faucets, has been sold to Milwaukee Brass Co., Cedarburg, Wis. Minnesota Chemical will use the 24,000-sq-ft building as a warehouse for distribution of its products in the Milwaukee area.

* * *

Oshkosh Die Casting Co., Oshkosh, Wis., has been formed by John Barver, 430 Central Ave., Oshkosh, to design, engineer and build die casting machinery.

* * *

Link-Belt Co., Chicago, through its Canadian subsidiary, Link-Belt Ltd., has opened a new 72,000-sq-ft engineering plant for the design and manufacture of conveying and processing equipment in Scarboro, Ont., about 10 miles northeast of Toronto. Steel fabrication and heavy assembly work have been moved to the Scarboro plant.

* * *

Midwest Package Corp., Sparta, Ill., began production recently of bronze grave markers and cemetery ornaments at a new foundry on McClurken Ave. in Sparta. The plant is affiliated with North American Bronze Co., which has opened a sales agency office in the Jo-Ann Building, Sparta.

* * *

Alten's Foundry & Machine Works, Lancaster, O., has bought the pumping unit line of Ideco Division, Dresser Industries Inc., Dallas, Tex., and will manufacture, sell and service the pumping units and spare parts for them.

* * *

Foxboro Co., Foxboro, Mass., has organized a Mexican affiliate, Graficas e Instrumentos, located in Mexico City, for the future manufacture and assembly of instruments and instrument supplies.

* * *

Thor Power Tool Co., Aurora, Ill., has opened a new sales and service factory branch office at 1 Tichenor Lane and Parkhurst St., Newark, N. J., to serve the northern New Jersey area formerly handled by the New York branch. Thor also has moved its Buffalo branch office to a new building at 735 Military Rd.

* * *

Yale & Towne Mfg. Co., Philadelphia, has appointed Materials Handling Products Corp., 2704 Erie Blvd. East, Syracuse, N. Y., to distribute its industrial trucks. Branch offices of the new distributor are located in Schenectady and Utica, N. Y.

* * *

Eutectic Welding Alloys Corp., 40-40 172nd St., Flushing, New York, broke ground recently for its new No. 3 Plant, which is to be built on land adjoining Plant No. 1. Cost of land, equipment and materials is estimated at $500,000. A fully mechanized welding electrode production line 273 ft long is to be installed.

* * *

Foundry Materials Inc. has been formed in Milwaukee by Adele B. Wallace, 3734 South Linebarger Terrace, Milwaukee 7, for the production and sale of individual minerals and foundry sands.

* * *

George F. Pettinos (Canada Ltd.), Hamilton, Ont., has been appointed by Cleveland Flux Co. to be sole representative for distribution of the latter's Cornell fluxes in Ontario and Manitoba.

Expand Research Coverage

The *Crerar Metals Abstracts* has increased its coverage to include research and development papers pertaining to vanadium. Monthly reports now cover papers of research interest in the fields of titanium, zirconium, hafnium, the rare earth, molybdenum, vanadium and ferrous alloys. As many as 170 such reports appear in a single issue.

Published by the John M. Crerar Library, 86 East Randolph St., Chicago, *Crerar Metals Abstracts* is offered on a subscription basis at $5 per 12 monthly issues.

Book Review

Aluminum in Iron and Steel, by Samuel L. Case and Kent R. Van Horn, cloth, 478 pages, 6 x 9 in., published by John Wiley & Sons Inc., New York, for the Engineering Foundation. Price $8.50.

This book is the first of a series of monographs on alloys of iron and steel that is planned to provide metallurgists and engineers with concise but comprehensive summaries of available data, as reported in technical literature, on the effects of selected metals on carbon steel and on simple and complex alloy steel and cast irons. As the title indicates, this work deals with the effects of aluminum.

Each monograph should bring together in one place essential information now scattered through hundreds of journals and books in many languages. The authors of each work are responsible for the selection, evaluation, organization and presentation of data, but each book is reviewed in manuscript by men qualified to criticize all statements.

The authors, Samuel L. Case and Kent R. Van Horn, are technical adviser, Battelle Memorial Institute, and director of research, Aluminum Co. of America, respectively.

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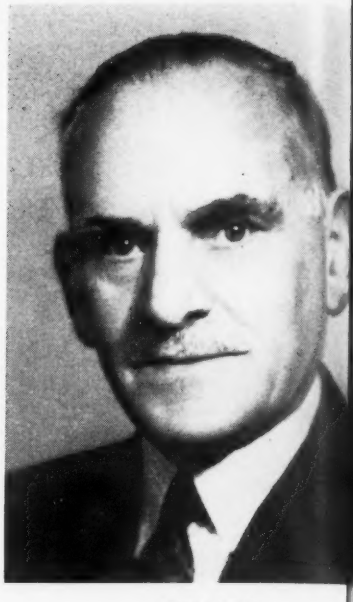


JOHN BELL
Senior Vice President

INSTITUTE of BRITISH FOUNDRYMEN

Holds 50th Annual Meeting

THE resort and convention city of Blackpool, Great Britain's Atlantic City, was the site of the 50th annual convention of the Institute of British Foundrymen, June 16 to June 19.

The annual general meeting of the members of the institute was held on the morning of June 17, with Dr. C. J. Dadswell, retiring president, in the chair. The annual general report showed how activities of the institute, especially of its technical council, had continued to expand during the year. For the first time in the institute's history, its membership exceeds 5000, a welcome achievement coinciding with the jubilee year of the organization to be celebrated in April, 1954.

Following the presentation of the report and accounts, the president announced the following awards:

Oliver Stubbs Medal to G. W. Nicholls, past president of the West Riding of Yorkshire branch, "in recognition of the outstanding quality of the many papers, largely of a practical nature, which he has presented to the institute, and for his contribution to the technical development of foundry practice."

E. J. Fox Medal to Sir William J. Larke, K.B.E., "in recognition of the great help and encouragement he has given to the foundry industry in many capacities."

Meritorious Services Medal to Harold Haynes, "in recognition of his active and exceptional work over a long period for the progress of founding, and in imparting his knowledge to others."

British Foundry Medal to D.F.B. Tedds, past president of the Bristol branch, for his paper on "Experiences with the Investment Casting Process."

The president then called on Secretary Tom Makemson to announce the awards of diplomas to these members: J. H. Jones for his paper "Production of Ingot Molds by Sandslinger," presented at the Buxton and Sheffield conference; J. M. Douglas and W. S. Richardson for their paper "The Practical Application of Some Modern Ideas in the Brass Foundry," presented to the Scottish branch; D. H. Potts for the paper "Aluminium Pressure Cast Matchplates," presented to the Birmingham and London branches; J. H. Pearce and G. D. Whitehouse for their paper "Casting Design in Relation to Production," presented to the Scottish branch.

The meeting then proceeded with the election of officers for 1953-54. E. Longden, M. I. Mech. E., now a consulting foundry engineer after having occupied positions as foundry and patternshop manager with leading engineering firms, was elected president. Senior vice president is John Bell, part owner of Albert Smith & Co., Glasgow, and junior vice president is Dr. A. B. Everest, Development and Research department, Mond Nickel Co., London.

John Blakiston, Vincent Delport, P. A. Russell, G. R. Shotton and Robert Yeoman were elected to the Council of the institute for two years, and John Hird and E. M. Currie were elected to the Council for one year.

Mr. Longden, the new president, received his technical education at the Manchester College of Technology and his practical training in the foundries of the British Westinghouse Co., now Metropolitan-Vickers Electrical Co. Ltd., Manchester. Subsequently he served as foundry, pattern shop and works managers of several companies before entering the practice of a consulting foundry engineer. Mr. Longden, active in the IBF for many years and past president of its Lancashire Branch, was awarded the Oliver Stubbs Gold Medal in 1936 and the British Foundry Medal cash prize in 1944.

Mr. Bell, new senior vice president, served as a patternmaker apprentice with Sir William Arrol & Co., Glasgow, and obtained his early technical training at evening classes in Glasgow and later at the Royal Technical College. Leaving the pattern shop to join Robert McLaren & Co., Glasgow, as a draftsman, he subsequently became works manager of that company. In 1920 Mr. Bell

DR. A. B. EVEREST
Junior Vice President

acquired Albert Smith & Co.; since 1950 he has been a co-partner of that concern with Alexander Marshall. Mr. Bell has been honorary secretary of the Scottish Branch, IBF, for nearly 30 years.

Dr. Everest, new junior vice president, was born in Lynn, Mass., and educated at Rugby School, England. After engineering and foundry training at the British Thomson Houston Co. Ltd., Rugby, he was graduated in metallurgy at Birmingham University and subsequently gained his doctorate. Dr. Everest worked with the Development and Research Division, International Nickel Co., later being transferred to a similar department of Mond Nickel Co. Ltd., England, when Mond and International were merged in 1929. During the last 25 years he has published more than 150 papers on cast iron. The Oliver Stubbs medalist in 1947, Dr. Everest is a past president of the London Branch, IBF, and in the last three years was vice president of the Technical Council.

Following the election Dr. Dadswell inducted the new president, E. Longden, into the chair, and Mr. Longden delivered his presidential address. His subject was "Science, Technology and Craftsmanship." He stated that foundry progress over the past 20 years has involved a steady shift of emphasis from the purely practical work and art of founding to the scientific, technical and engineering aspects of castings manufacture and that members of the institute constitute an excellent cross-section of scientific and technical workers.

(*Please turn to page* 230)

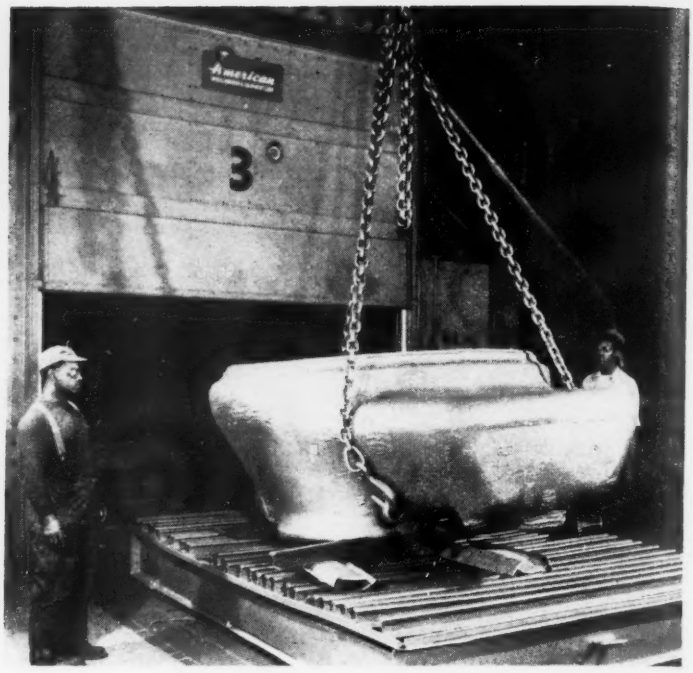
G. W. NICHOLLS, who was awarded the Oliver Stubbs Medal, is manager and metallurgist of Modern Foundries of W. Asquith's Ltd., Halifax. Born in 1911, he was educated at Rutherford Technical College and served his apprenticeship in the laboratory and foundry of North Eastern Marine Engineering Co., Wallsend-on-Tyne. Mr. Nicholls subsequently served for nine years in the technical and research department of A. Reyrolle & Co., Hebburn-on-Tyne. He joined Modern Foundries in 1940 as chief chemist and assistant manager and was appointed to his present position in 1945. Mr. Nicholls is the author of the institute's official exchange paper to the 1953 convention of the American Foundrymen's Society.

SIR WILLIAM LARKE, recipient of the E. J. Fox Medal, was educated privately. He joined the British Thomas-Houston Co. in 1898 and in 1899 became engineer and manager of the power and mining department. Appointed executive engineer in 1912, he resigned in 1915 to serve with the Ministry of Munitions. He was made Director General of Raw Materials and was a member of the Disposal Board 1919-22. Director of the British Iron & Steel Federation from 1922 to 1946, Sir William also held many other public appointments. Currently a vice president of the Iron & Steel Institute, which awarded him the Bessemer Medal in 1947, he is past president of the Institute of Welding (1938-42), the Junior Institution of Engineers (1936-37) and the Institute of Fuel (1933-34).

Navana Vandyk Ltd., London

HAROLD HAYNES, who received the Meritorious Service Medal, is foundry manager at the National Gas & Oil Co. He served his apprenticeship at Moorhouse's Brass Foundry, Stalybridge, and at Scott & Hodgson, Guide Bridge. He later served at foundries engaged in making large internal combustion engine castings and joined National Gas & Oil Co. in 1918. He introduced loam molding there and designed and erected the pits now used to make large engine beds and columns. He was appointed foreman in 1939 and foundry manager in 1943. He is a past president of the Lancashire Branch of the IBF and has long been active in many capacities in the organization.

D. F. B. TEDDS, winner of the British Foundry Medal and Prize, is superintendent of the Bristol Aeroplane Co. investment casting foundry. He was educated at Coventry Technical College and at Central Technical College, Birmingham. His first position was in the laboratories of Daimler Co., from which he went to Northern Aluminum Co., Banbury. Later he joined Bristol Aeroplane Co. as foundry metallurgist. After Mr. Tedds had been associated with the light alloy and bearing foundries, he started work on the investment process. Past president of the Bristol and West of England Branch of the IBF, he also is a Fellow of the Institution of Metallurgists and a member of the Iron & Steel Institute.



A rough turret for an M-47 tank is shown at left, after shakeout and normalizing, about to be pulled into a blast machine at American Steel Foundries. At right a cleaned turret is being removed from the blast cabinet work car by chain hoist. Big equipment is required in . . .

Cleaning Cast Steel Armor

By ERLE F. ROSS
Chicago Editor

IN the production of cast steel armor hulls and turrets for military tanks, a sizable portion of foundry time is required to clean the castings. Between shakeout and final acceptance, the castings are blasted five to eight times. It is important, therefore, that cleaning procedure be efficient and that equipment have sufficient capacity and flexibility to prevent processing bottlenecks.

The size and shape of tank hull and turret castings introduce some cleaning problems. Hulls, for example, are large and weigh tons, rather than pounds. This introduces handling difficulties. And turrets as well as hulls are of such design that some sections of the interiors are difficult to reach for easy cleaning.

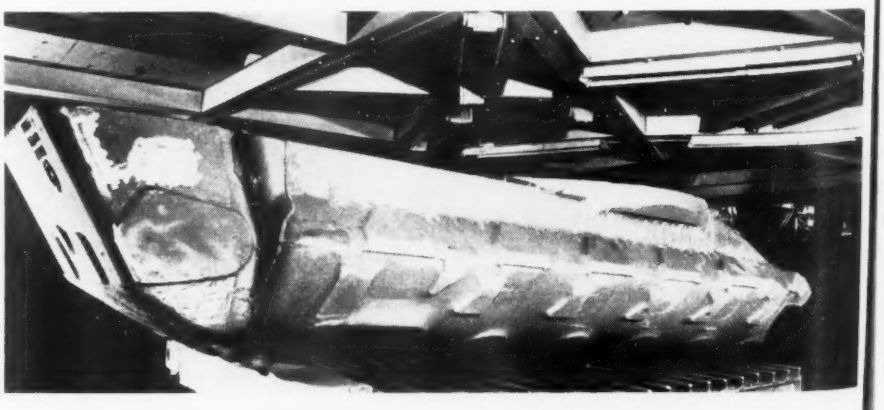
Last July Army Ordnance announced the Patton 48 medium tank, the first completely new medium tank developed since World War II. The vehicle, in the 45 to 50-ton class, provided outstanding features. Its new design gives it a low silhouette, elliptical sides, elliptical turret and stronger and wider tracks. The hull-turret combination of the Patton gives maximum protection for least weight.

Most significant feature of the Patton 48 from the viewpoint of tank builders, however, was the fact that this was the first time it had been possible for armor manufacturers to make a one-piece cast hull in volume. Previously hulls had been cast in front and rear sections and welded together. The larger size of the one-piece hull confronted the foundry with the necessity of installing automatic cleaning equipment bigger than anything else that had been previously engineered.

Armor castings for the Patton 48, as well as the M-47 medium tank, have been produced in the Cast Armor Division of American Steel Foundries, East Chicago, Ind. This company built and operated the huge plant for the government during World War II. At end of the war, operations were suspended and the $26 million facility was declared surplus and offered for sale. No buyer was found so the property remained in government ownership and was used for storage purposes. In December, 1950, some six months after Korea, American Steel Foundries was called upon to reactivate the plant.

Considerable time and money were spent in rehabilitating and modernizing the plant and by latter part of

(*Continued on page* 180)



Hull casting for Patton-48 tank on worktable after cleaning in nine-wheel blasting machine. Some wheel positions are visible in ceiling

These Three

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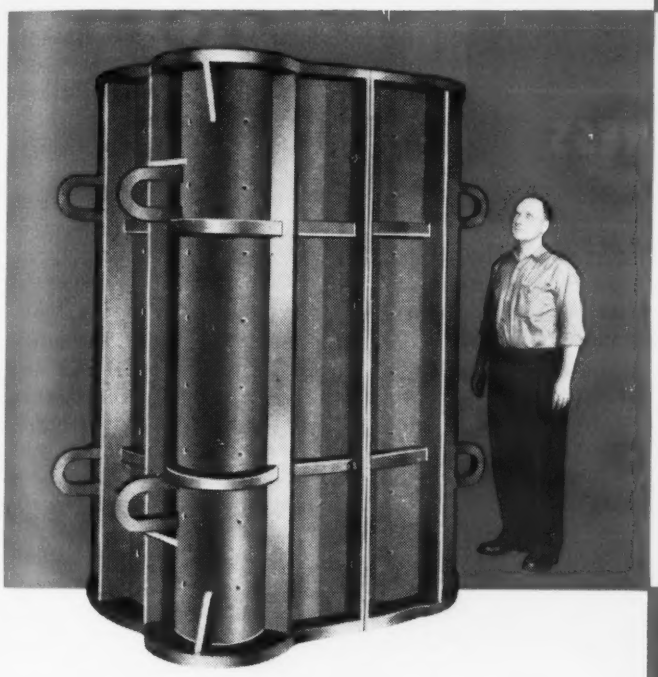

Four section flask with total weight of 10,152 lbs. Sidewalls and bars ½" thick. Flanges 1" x 5" with channel reinforcement.

Unusual shape and construction—for casting ingot molds. ½" sidewalls, 2" x 5" flanges. Weight 6,414 lbs.

Six section flask with bottom plate, loaded for shipment. Flask made with ½" material. 1" x 3" flanges and a ⅜" channel specially formed to give strength to the shallow 6" sections. Total weight 16,620 lbs.

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(*Continued from page* 178)

1951 production of M-47 tank hulls was under way. A good portion of the original production and processing equipment has been replaced with new because in the interim between World War II and Korea armor protection for tanks was enlarged greatly to make it more difficult for penetration by enemy shells.

Included in the new equipment are two blast cleaning installations engineered for their special assignment by American Wheelabrator & Equipment Corp., Mishawaka, Ind. The larger of the two, and the biggest which the company has built, is a nine-wheel unit; the other has five wheels.

The larger machine cleans Patton 48 hulls. It has a cabinet 28 x 29 ft in floor area and 8 ft 6 in. between floor level and ceiling. Provided in the floor is a turntable 17 ft 6 in. in diameter which is capable of supporting work having a maximum swing diameter of 26 feet. All nine wheels are in the ceiling of the cabinet. Abrasive used is 0.062-in. cut steel wire pellets.

The cabinet has electrically-operated, vertical lift type doors on two opposite sides so that work can be loaded or unloaded from either side. The work is loaded on either of two steel cars 15 ft long and 8 ft 6 in. wide and mounted on a track running through the cabinet and matching with the turntable track. Car movement is by ropes and electrically-operated capstan winches, one for each side of the machine. The cars are hitched together and work as a pair. As one car is pulled out of the cabinet for the casting to be turned over or removed, the second car carries a casting into the blasting zone.

As stated previously, each tank casting may be blasted from five to eight times during its processing. The first cleaning comes after shakeout and normalizing. Cleaning time for this condition is about 15 minutes in one position, after which the casting is turned over and given 15 minutes in the new position. The inside of the hull nose is extremely difficult to blast because it is out of effective reach of the blast streams, consequently the hull is taken to an adjacent air blast room for about 10 minutes of spot touchup in the nose.

Repeat Cleaning if Necessary

After the initial blasting, the gates and risers are burned off the casting. Every casting is x-rayed for soundness, and if defects are found, these must be burned out preparatory to welding. The burning operation must be followed by another cleaning so that cleaning surfaces are presented for the welding.

When welding has been completed the casting must be cleaned again to remove slag, flux, and the like, which would interfere with a second inspection by x-ray. If shown necessary, further burning and welding is undertaken with cleaning performed in the sequence just explained. This procedure is repeated as often as may be necessary.

The time required for blast cleaning after burning or welding usually runs only from 5 to 7 minutes, depending upon the conditions the individual casting presents. When the hull casting passes its final x-ray inspection, it is subjected to laborious chipping and grinding.

Two men attend the blast unit—one is classed as the operator and the other as helper. They supervise the loading and unloading of the castings into the blast cabinet, control the blasting time and regulate the abrasive flow to the hurling wheels. Blasting time and abrasive flow are set on control panels, and nine ammeters, one for each wheel below the panels on the left, indicate the amount of

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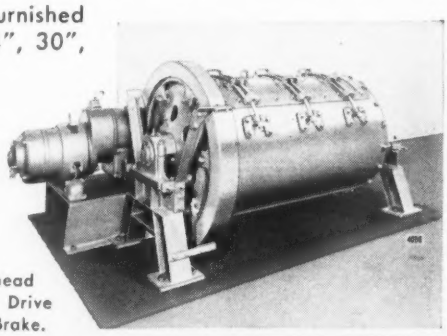
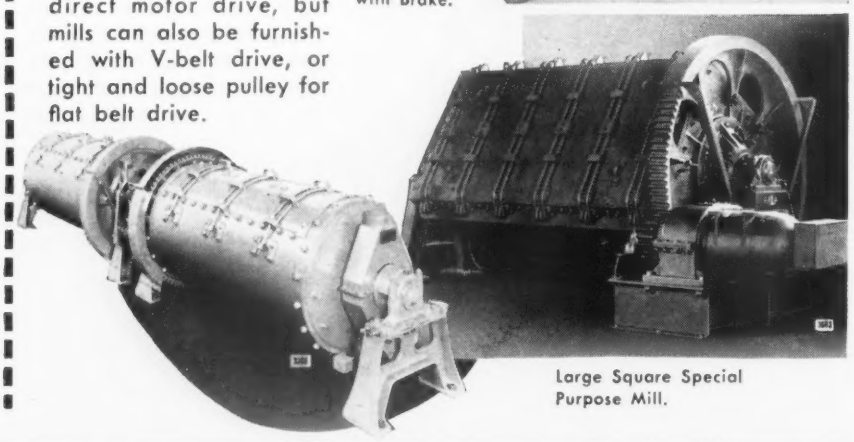


Gearhead Motor Drive with Brake.



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abrasive being thrown. Each wheel can be individually set.

It is pointed out that to obtain cleaning performance comparable with the automatic blast procedure would require from 4 to 5½ hours of time from each of two men in the airblast room. Upon those occasions when the blast unit is heavily committed with work and so as not to interfere with its schedule, it is customary to use the air blast room to do touch-up cleaning after burning or welding operations. On the other hand, during periods in which the equipment may be caught up and is not fully engaged, it sometimes is utilized to clean some of the M-47 tank hulls which normally are handled in the smaller five-wheel Wheelabrator in another department.

Except for size and number of wheels, the latter unit is similar in design and operation to the nine-wheel equipment. Its cabinet is 17 x 18 ft. in floor area and has a height of 8 ft. 6 in. The floor level turntable is 14 ft. in diameter and the work-holding cars are 12 ft. long and 8 ft. 6 in. wide.

The five-wheel unit is used for cleaning front hulls, rear hulls and turrets for the M-47 medium tank and turrets for the Patton-48 tank. Blast time for turrets in the rough state—after shakeout and normalizing—is about 12 minutes in each of two positions—top side up and reversed. Time is approximately the same for front hulls and rear hulls, although in case of the latter a table load consists of two castings instead of one.

Blast medium in this equipment is S-660 cast steel shot, and two men direct the operations. Customarily the castings go through the unit five or six times before they reach the finished state.

Reaches 50th Anniversary

Incorporated in 1903, Acme Foundry Co., Detroit, producer of automotive castings and melting pots, has increased its capital stock ten-fold in the 50 years since then. The firm's first building was a small, wooden structure equipped only with jib cranes. Operations now are housed in a large, modern foundry with new cupolas, one of which is charged with a skip hoist, and with electric cranes of up to 25-tons capacity.

Officers of the company are William Christian Sr., president; J. D. Christian, vice president, treasurer and general manager, and William Christian Jr., secretary. With Mrs. William Christian Sr., the above also compose the board of directors.

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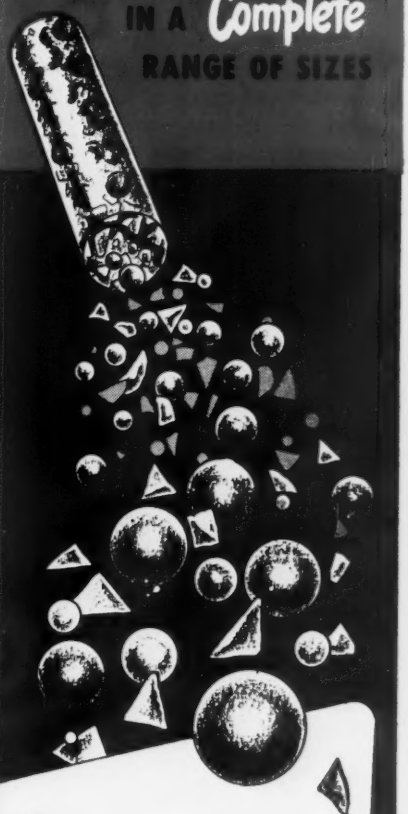

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Activities of Foundry Groups

Central New York

IN SPITE of cold and rain, 150 members and guests of Central New York Chapter of the AFS attended the annual clambake of the organization on June 13, at Mountain Top Grove, Binghamton, N. Y. Large quantities of food helped to offset the poor weather and to make the affair a satisfying close to chapter activities for the 1952-53 season. —*Harold Brakeman, City Pattern Shop.*

Reading

A REVIEW of "Recent Developments in the Foundry Industry" was presented by Harold M. Bogart, metallurgist, Ford Motor Co., Dearborn, Mich., at the May 19 meeting of Reading Foundrymen's Association, Reading, Pa.

The speaker said some of today's practices are neither new nor unique but do provide advantages for more efficient use of equipment. In discussing the cupola, Mr. Bogart referred to water cooling the shell to reduce refractory cost and obtain greater metallurgical control; basic cupola linings for reduction of sulphur; hot blast as an aid to better metallurgical control; and oxygen enrichment of blast air for improved melting rates.

With regard to electric furnace practice, Mr. Bogart believes oxygen injection will be more widely practiced in the future.

Mr. Bogart urged foundrymen to utilize existing equipment to produce at a greater capacity and to move along in an aggressive and inquisitive manner to make a wider range of castings of better quality and at lower costs.

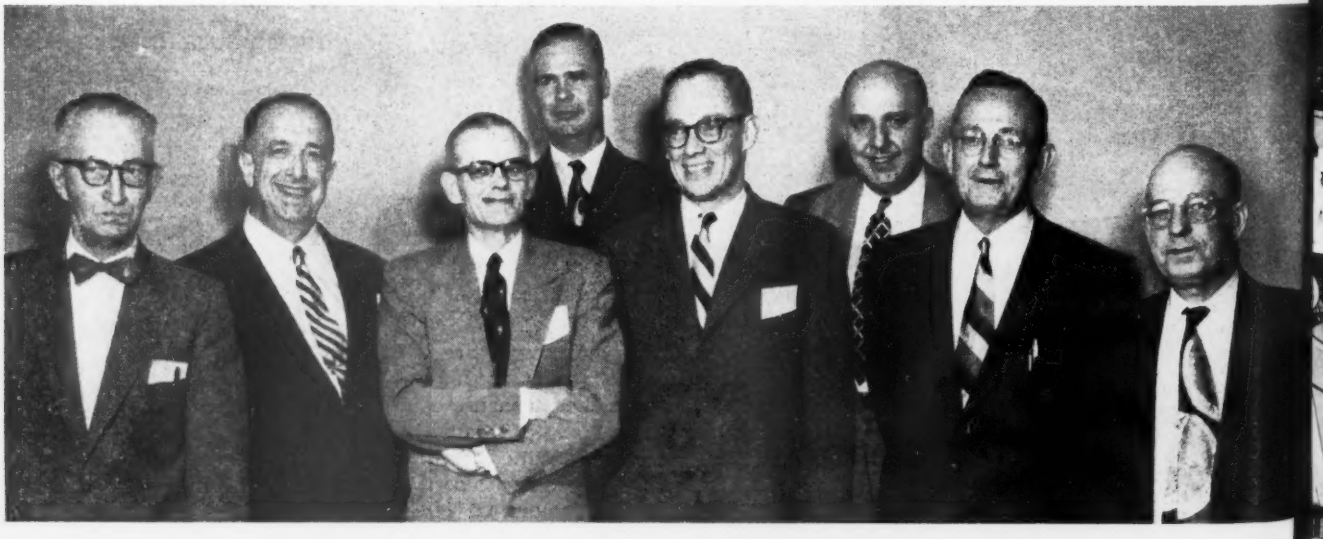
Officers of the association were re-elected for another term. They are: James S. Hinkley, Dick Bros. Inc., Reading, president; James Woodward, Excelsior Brass Foundry, Reading, vice president; Paul K. Reiniger, Textile Machine Works, Reading, treasurer; and William I. Cassidy, secretary. Members of the executive committee are: Paul B. Harner, George C. Kissell, Paul K. Reiniger, James Stewart, John Swengel, Arlan L. Wentzel and James Woodward.—*William I. Cassidy.*

Texas

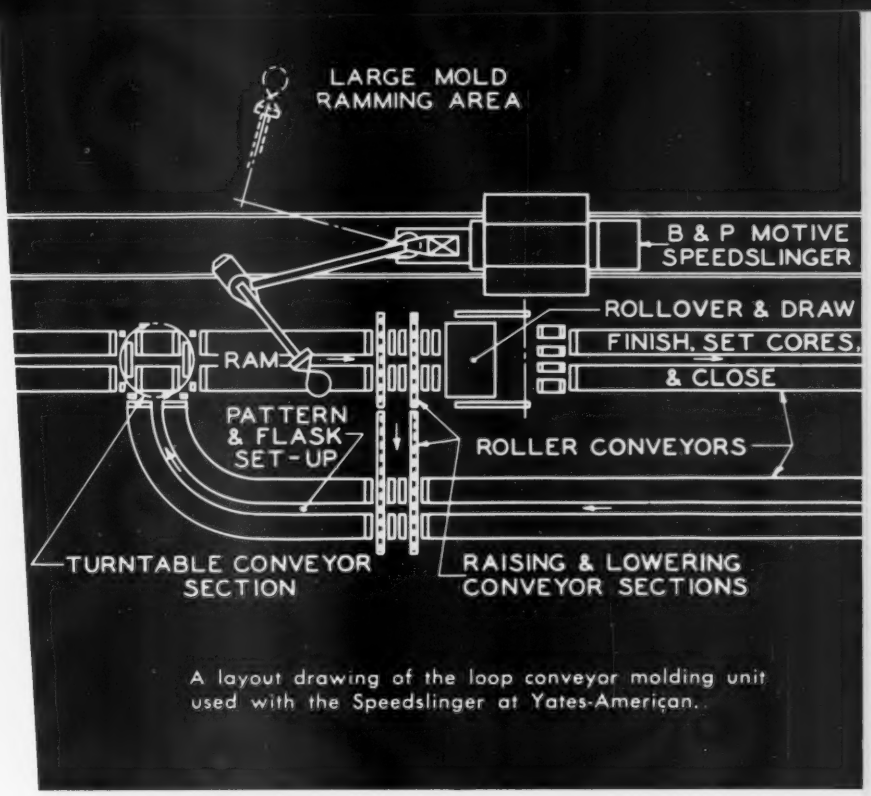
TO CONCLUDE the current chapter season, the Texas Chapter of AFS met May 16 at the Galvez Hotel, Galveston. Ed C. Burris, executive vice president, Texas Manufacturers' Association and William R. Bond, vice president, Lone Star Steel Co., Lone Star, Tex., were speakers.

(*Continued on page* 185)

WESTERN NEW YORK Chapter of the AFS installed its new officers and directors May 2. Lower view, left to right, are Fred J. Goerke, Standard Buffalo Foundry, director; A. J. Heysel, E. J. Woodison Co., secretary; Joseph Clifford, Atlas Steel Castings Co., chairman; J. Edmund Burke, Hanna Furnace Corp., director; William H. Oliver, Bond Plant of American Radiator & Standard Sanitary Corp., vice chairman; Erwin W. Deutschlander, Worthington Corp., past chairman; Martin Pohlman, Pohlman Foundry Co., treasurer; and William H. Taylor, Worthington Corp., custodian. Top view shows a group from Tonawanda Electric Steel Castings Corp., North Tonawanda, N. Y. Photos are by courtesy of Jack Heysel, E. J. Woodison Co., Buffalo



YATES-AMERICAN BOOSTS PRODUCTION 33%

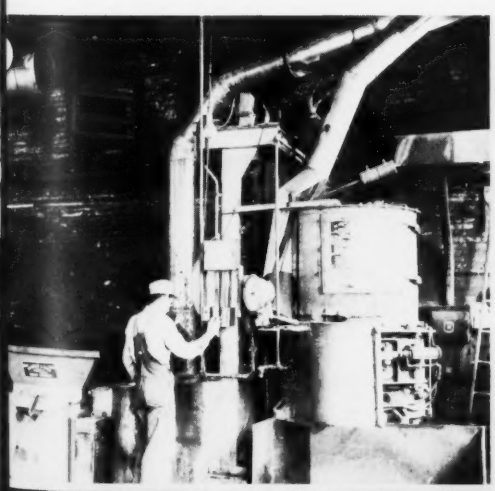


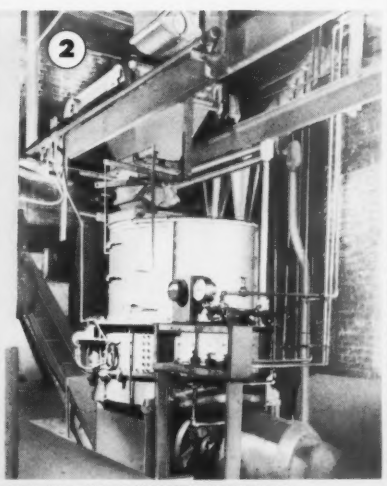
A layout drawing of the loop conveyor molding unit used with the Speedslinger at Yates-American.

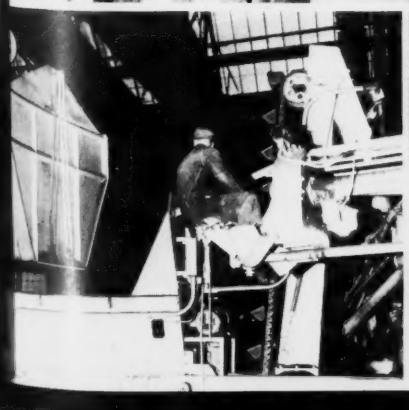
Higher foundry production to meet increased demand *was* a problem for Yates-American Machine Co. of Beloit, Wisconsin. But *today* that problem is solved . . . for after thoroughly considering all types and makes of foundry equipment, they selected Beardsley and Piper's Model '60' Speedmullor, a small Speedmullor-Preparator Unit, and a Motive Speedslinger. This equipment does the job the way they want it done . . . *with production increased 33%*.

Now this world-famed manufacturer of woodworking machinery rolls out work on *schedule* and costs have been considerably reduced. Castings have a smoother finish and are much truer-to-pattern. Management is *pleased* . . . and so are the foundry's employees, for tough, back-breaking jobs have been eliminated and working conditions have been improved.

It will pay you to discuss *your* mechanization problems with B&P engineers! Write today . . . Beardsley & Piper, Div. Pettibone Mulliken Corp., 2424 No. Cicero Avenue, Chicago 39, Illinois.







1. All of the molding sand for the side floors at Yates-American is thoroughly conditioned by this low cost Speedmullor-Preparator Unit.

2. A Model '60' Speedmullor thoroughly mulls all of the slinger's molding sand. A 45 second mulling cycle is ample for complete mulling.

3. The slinger is equipped with portable tanks. One is used on the slinger while the other is loaded directly from the '60' mullor.

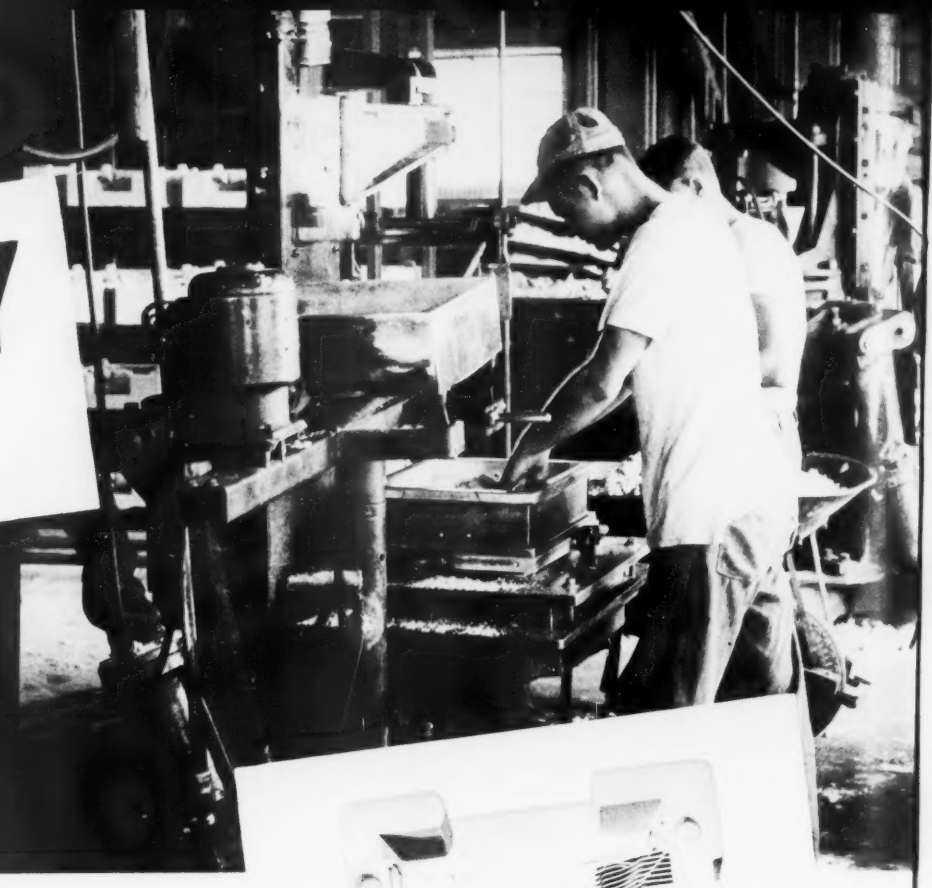
4. With the Motive Speedslinger, five men produce nine tons of heavily cored castings from a large variety of patterns during each eight-hour day.

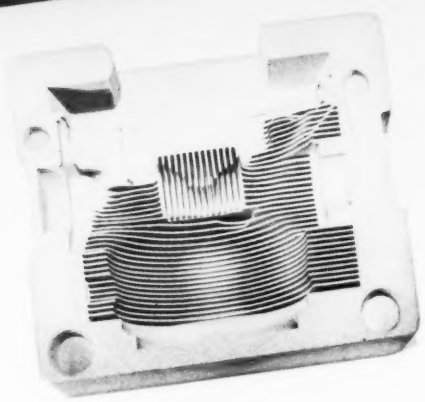
B&P

LOOK TO BEARDSLEY & PIPER FOR BETTER METHODS

MEMBER FEMA

CHEMALLOY
checked them all





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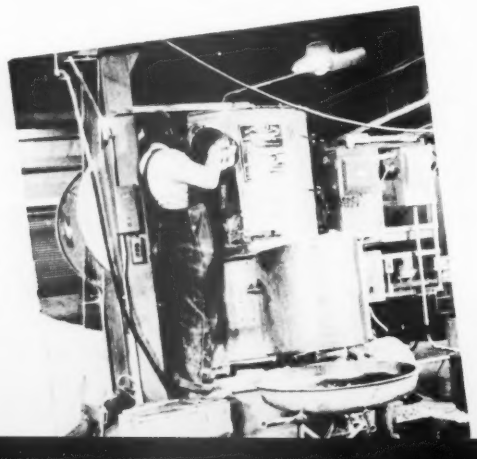
could do this job!

Chemalloy Company of Louisiana, Missouri, had a really tough core job in making air-cooled cylinder heads. The making and drawing of these cores with their deep fragile fins were real core room problems.

Chemalloy checked all rollover machines that might do the job, but only a J&J Jolt Rollover met their specifications. Two J&J 612 RPs were installed, and the job has been running smoothly ever since. Two B&P Roller Riddles, used with the rollovers, eliminate any necessity for manual riddling, and give a perfect finish over the entire core.

For your own very difficult core making or molding jobs, or for all jobs that require the maximum in dependability and performance from a molding machine, you can't beat Beardsley & Piper—J&J . . . a *full* line of machines completely *redesigned* by the country's top foundry equipment engineers. Write for catalog now! Beardsley & Piper, Div. Pettibone Mulliken Corp., 2424 No. Cicero Avenue, Chicago 39, Illinois.



. . . and a '40' Speedmullor thoroughly mulls all of the core sand increasing production 25% and cutting core rejects 20%. A ⅓ saving has been made in the use of costly core sand additions.

B&P

LOOK TO
BEARDSLEY & PIPER
FOR BETTER METHODS

MEMBER FEMA

(*Continued from page* 182)

There were 58 members present.

Following are newly elected officers: Chairman, Israel Smith, Western Foundry Co., Tyler, Tex.; vice chairman, Ed W. Wey, Dee Brass Foundry, Houston, Tex.; secretary, E. C. Brown, Whiting Corp., Houston; treasurer, David K. McKie, Tyler Pipe & Foundry Co., Tyler.

Elected to the board of directors are: W. R. Bond, Lone Star Steel Co., Lone Star; Ivan L. Greene, Eastern Clay Products Department, Fort Worth, Tex.; C. W. Williamson, Trinity Valley Iron & Steel Co. Inc., Fort Worth; R. H. Glenney, Alamo Iron Works, San Antonio, Tex.—*Israel Smith, Western Foundry Co.*

Southern California

ELECTION of officers was held at the May 15 meeting of Southern California Chapter of the AFS. Newly elected president is Hubert Chappie, National Supply Co., Torrance, Calif.; vice president, Charles R. Gregg, Gregg Iron Foundry, El Monte, Calif.; secretary, William Baud, Mechanical Foundries Division of Food Machinery & Chemical Co., Vernon, Calif.; treasurer, William Mitchell, Utility Steel Foundry, Vernon, Calif.

Directors elected include Robert Ditmore, Federated Metals Division, American Smelting & Refining Co.; Werner Stenberg, U. S. Electrical Motors; Martin Robinson, General Metals Corp., and Earl Tibbets, Los Angeles Steel Castings Co.

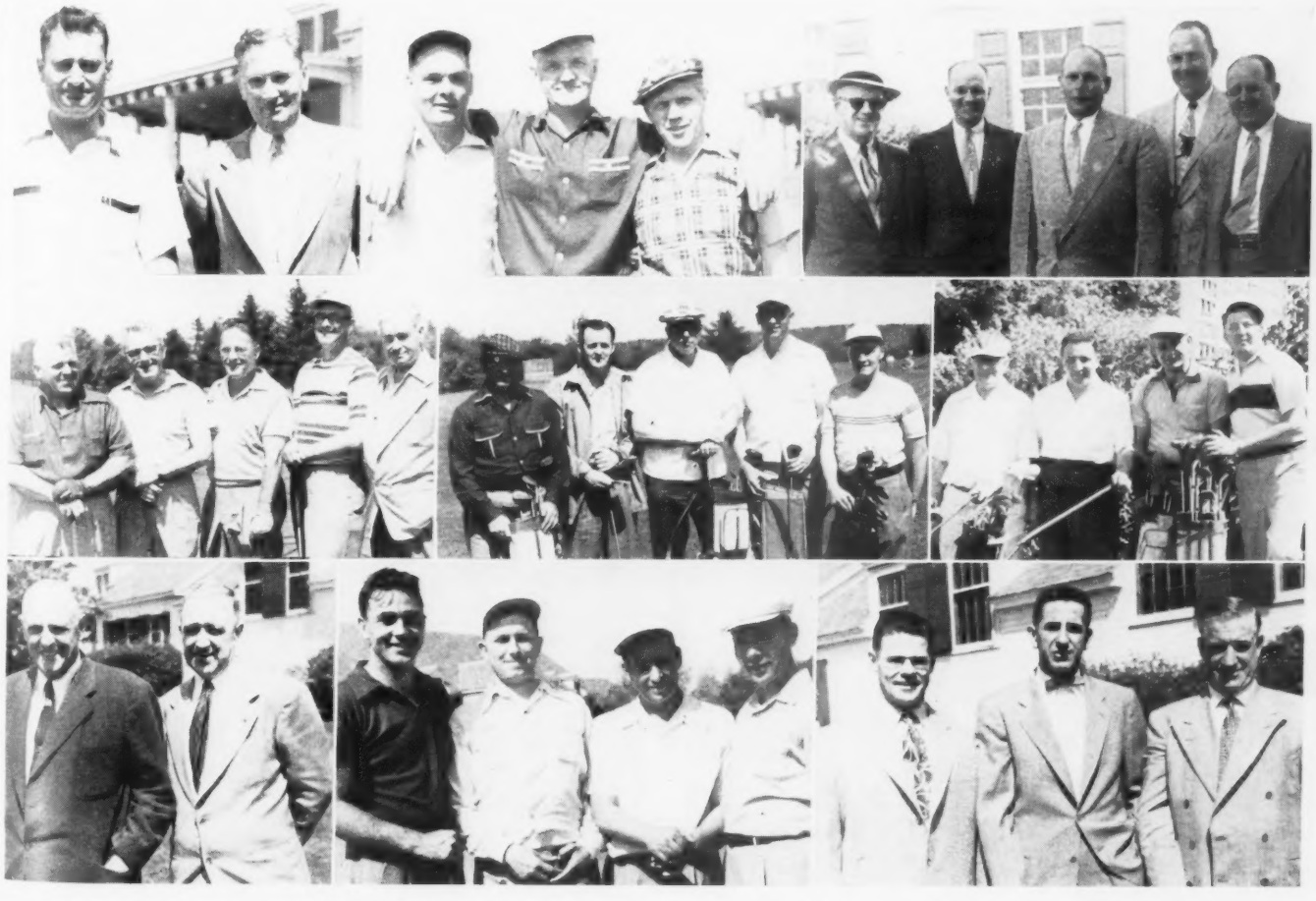
Albert G. Zima, International Nickel Co., was the speaker featured at the technical session. His discussion was entitled "Modern Cast Irons."—*K. F. Sheckler, Calmo Engineering Co.*

NORTHEASTERN OHIO Chapter of the AFS celebrated Old Timers and Past Presidents Night and elected officers for 1953-54 at the May 14 meeting. Retiring President Frank Cech, Cleveland Trade School, on left, was presented with a wristwatch. The presentation was made by John F. Roth, Cleveland Standard Pattern Works, on the right

Northeastern Ohio

CLOSING its regular monthly meetings for the 1952-53 season on May 14, Northeastern Ohio Chapter of the AFS on May 14 held Old Timers and Past Presidents Nights, elected officers and presented a variety program for the pleasure of the 300 members and guests. Bob Robinson arranged the entertainment.

New officers are Stephen Kelly, Eberhard Mfg. Division, Eastern Malleable Iron Co., president; David



NEW ENGLAND FOUNDRYMEN'S ASSOCIATION held its annual summer outing June 10 at Oak Hill Country Club, Fitchburg, Mass. Shown at top left are H. M. Frechette, outing chairman, on left, and F. R. Elliot, chairman of forthcoming 13th New England Regional Foundry Conference. Other views show members of the association at the outing. Photos are by C. A. Wyatt, Debevoise-Anderson Co., Boston

Clark, Forest City Foundries Co., 1st vice president; Lewis T. Crosby, Sterling Wheelbarrow Co., 2nd vice president; Howard E. Heyl, Federal Foundry Supply Co., secretary; and F. Ray Fleig, Smith Facing & Supply Co., treasurer.

New directors for three years are: A. J. Harlan, Hickman, Williams & Co.; R. D. Walter, Archer-Daniels-Midland Co.; Alex Troiano, Case Institute of Technology; A. J. Dublo, Sterling Foundry Co.; and Gordon Wiltse, Parker-Street Castings Co. Retiring President Frank Cech, Cleveland Trade School, who was presented a beautiful wristwatch by the chapter's Patternmaking Division in appreciation of his work the past year, will be a director for one year.

The chapter held its annual summer outing on June 26 at the Twin Lakes Country Club, near Kent, O. Over 300 persons enjoyed golf, swimming, baseball, prizes and a steak dinner.—*Jack C. Miske*

Philadelphia

APRIL meeting of Philadelphia Chapter of the AFS was President's Night at which 150 members and guests were present to honor I. R. Wagner, Electric Steel Casting Co., Indianapolis, and president of the society. Mr. Wagner reviewed the aims and ideals of the AFS and described the functions and work being done by various committees.

Principal speaker was W. G. Parker, supervisor of development, General Electric Co., whose topic was "Green Deformation in Molding Sand as an Aid to Sand Control." Charles W. Mooney, Link-Belt Co., served as technical chairman.

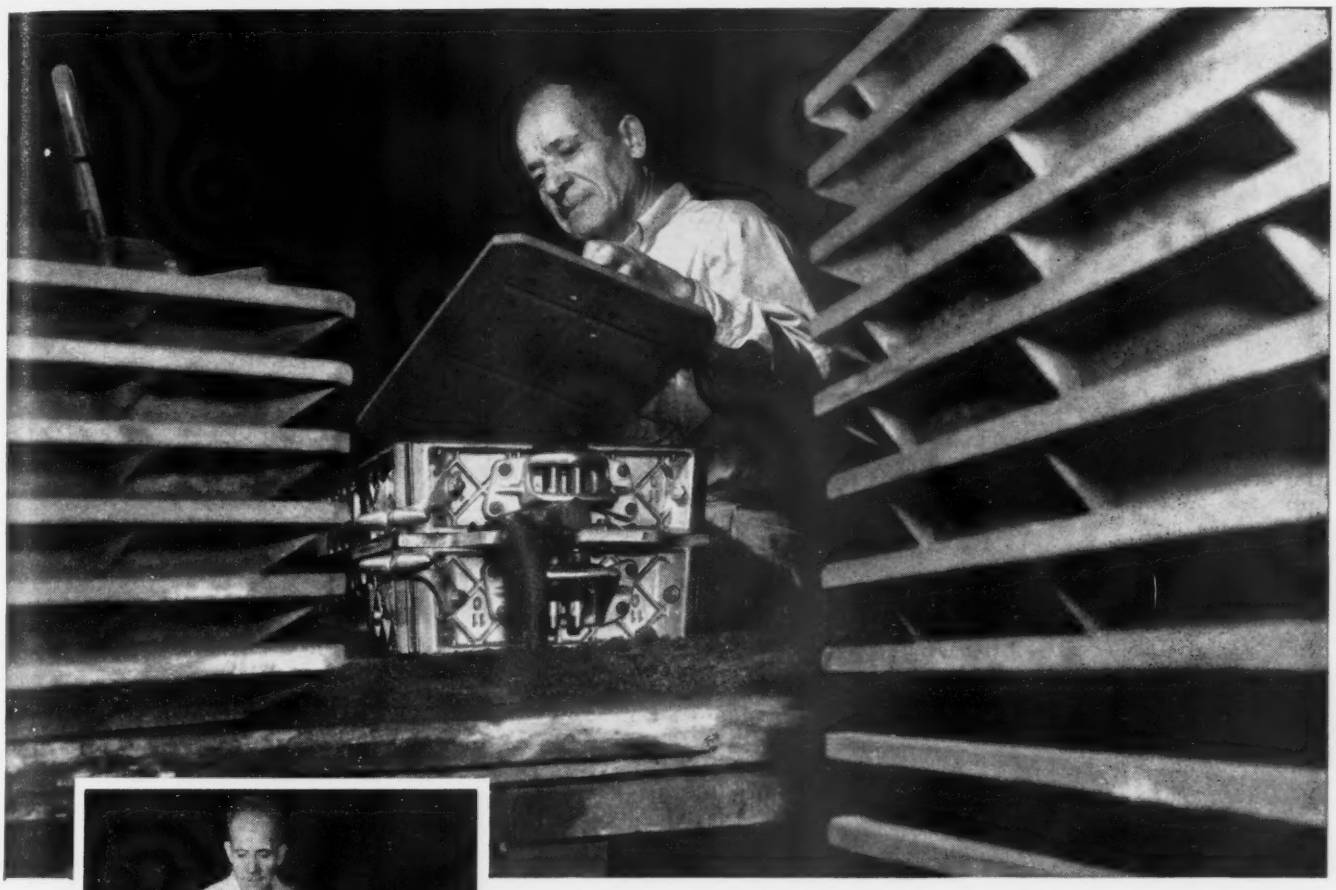
Mr. Parker described the deformation test in detail. He believes foundrymen should pay more attention to deformation values which indicate the ease with which a pattern may be drawn from a mold and the degree of accuracy of the mold cavity. By using this control, his shop has reduced defects by bringing sands back to standard immediately upon noting a variation.

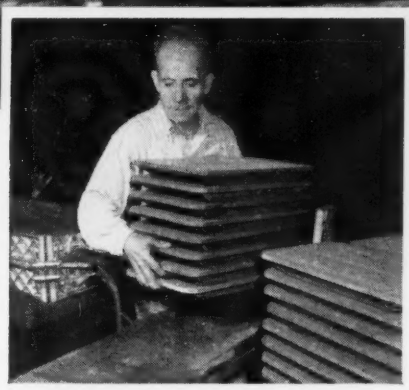
Sand Toughness Number (STN) is the product of the deformation × green compression strength × 1000, which is an indication of the workability of sand, and may also be used as a control value in day to day operation. Another advantage is to provide foundrymen with a tool for making a better selection of sand.

Under the successful sponsorship of Philadelphia Chapter of the AFS, a two-day Dietert sand school course was conducted June 4-5 at Drexel Institute of Technology by Frank S. Brewster, Harry W. Dietert Co., Detroit. Sixty-two foundrymen enrolled for the course, some of them from Metropolitan and Chesapeake Chapters of the AFS. The course was divided into three sections, introductory remarks about sand con-

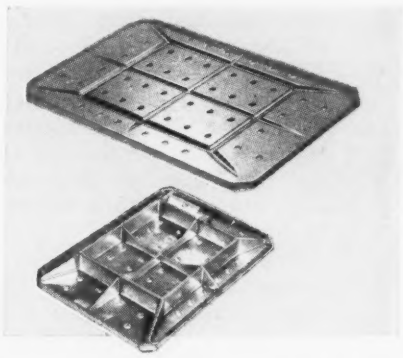
(*Continued on page* 188)

MICHIGAN STATE COLLEGE Student Chapter of the AFS visited the Dow Chemical Co. foundry, Bay City, Mich., on Apr. 23. The group which made the trip is shown in the lower scene. The view at the left shows retiring MSC Pattern Instructor George Posthumus being presented with a set of bronze book ends that was cast and finished in the college foundry. The presentation was made by Kenneth Priestly, right, Vassar Electroloy Products Inc., class of 1938, who is one of the many students taught by Mr. Posthumus during his 35 years with the engineering college staff





Molder finds EDCO Dowmetal Bottom Boards are light, easy to handle and stack.



"We cut our board losses from 7500 down to 12 . . . by switching to EDCO Dowmetal Bottom Boards"

— *says R. D. BAYSINGER, Manager, Foundry Division*
GREENLEE BROS. & CO., ROCKFORD, ILLINOIS

Analysis of five-year records at the Foundry Division of Greenlee Bros. & Co. revealed a loss of only 12 Edco Dowmetal Bottom Boards, in contrast to a normal loss of 7500 wood boards during the same period of time.

"Further," says Baysinger, "we estimate *our scrap loss has been cut 20% since switching to Edco.*" Benefits like these are typical. For example, another Edco user commented, "Our old wood boards had a life of about two weeks; and toward the end of their life-span, they always produced some poor castings which had to be rejected." Edco Dowmetal Bottom Boards are different: they stand up under constant use . . . and keep casting quality up, too.

Add to this the fact they are light, easy to handle—stack in small space, easily and securely—and you'll see why it's "good business" to switch to Edco.

Write us, or phone CApitol 7-2060 for price schedule and list of 78 standard sizes available from stock.

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PHILADELPHIA Chapter of the AFS made its April meeting AFS President's Night. From left to right are Donald Bryden, Philadelphia Brass & Bronze; past President of the AFS I. R. Wagner, Electric Steel Castings Co.; W. G. Parker, General Electric Co., guest speaker; William Graden, Simmons Abrasive Co.; and Charles Mooney, Link-Belt Co., who was technical chairman

(*Continued from page* 186)
trol, a discussion of individual properties and an investigation of individual problems.—*Herman E. Mandel. and D. E. Best, Bethlehem Steel Co.*

Michigan State College

A VISIT to the Dow Chemical Co. foundry in Bay City, Mich., on Apr. 23 gave members of Michigan State College Chapter of the AFS an over-all view of magnesium foundry practice and an excellent example of quality control methods.

At the college's annual Engineering Expositon, May 1-2, the chapter combined displays from industry with continuous molding and pouring demonstrations in aluminum which attracted and held the attention of many spectators.

On June 6, approximately 100 foundrymen attended the fifth annual Student Industrial Dinner at the college's Kellogg Center. Sponsored by the student chapter, the dinner is a project to familiarize foundry students with industrial personnel from the surrounding area.

Collins L. Carter, national president of the AFS, was introduced to the group and gave an interesting account of the growth of AFS student chapters. He stated that the student groups are considered one of the most important parts of the national organization.

R. V. Righter, Central Foundry Division, General Motors Corp., and A. E. Rhoads, Engineering Castings Inc., industrial advisers to the chapter, complimented Prof. C. C. Sigerfoos of the college's foundry department for his work and lauded the chapter on the progress it had made during the year. Mr. Rhoads discussed the moral and character development needed by engineers and pointed out that more technical personnel are found unsatisfactory by industry because of personality conflicts than because of technical shortcomings. Mr. Righter followed his remarks with two color films on shell molding.

Dean Lorin Miller, retiring dean of engineering at MSC, and George Posthumus, retiring pattern instructor, were presented with bronze book ends cast and finished in the college foundry. Everyone present was given a souvenir model aluminum cupola designed and cast by student chapter members.

New chapter officers are Bruce Harding, chairman; Claridon Thomas, vice chairman; Fred Hodgson, secretary-treasurer; and Thomas Thomas, corresponding secretary. — *Bruce Harding and Thomas Thomas.*

Detroit

THERE were 80 members and guests present to hear Herbert Scobie, technical editor of *American Foundryman,* discuss "Foundry Progress" at the May 21 meeting of Detroit Chapter of the AFS. Meeting was held at the Detroit-Leland Hotel.

Walter Seelbach, past president of AFS and president, Superior Foundry Inc., Cleveland, spoke briefly on the society's recent convention at Chicago and the 1954 meeting to be held in Cleveland. Fred Walls, International Nickel Co., Detroit, introduced Dr. Richard Flinn, University of Michigan, who described progress in modernization of the University of Michigan foundry.

Among the topics covered by Mr. Scobie were, shell molding, metal solidification, pneumatic core sand systems, pearlitic malleable iron, and pressure molding—*Walter P. Kantzler, Kelsey-Hayes Wheel Co.*

NORTHERN CALIFORNIA Chapter of the AFS welcomed past presidents and old timers and installed officers for 1953-54 at the June 26 meeting. From left to right are Director H. Hirsch, American Manganese Steel Co.; Program Chairman John Bermingham, E. F. Houghton & Co.; Chairman W. S. Gibbons, Ridge Foundry Co.; Assistant Program Chairman Clayton D. Russell, Phoenix Iron Works; and Director Charles Marshall, Industrial Foundry Supply Co. New officers not shown include Secretary Davis Taylor, American Wheelabrator & Equipment Corp.; Treasurer Fred Mainzer, Pacific Brass Foundry Co.; Director Gordon Martin, Atlas Foundry & Mfg. Co.; Director Clayton Russell, Phoenix Iron Works; and Director George Stewart, East Bay Brass Co., immediate past chairman. Installation was held at the Shattuck Hotel, Berkeley

Central Michigan

AT THE APR. 15 meeting of Central Michigan Chapter of the AFS, held in Battle Creek, Mich., Richard Herold of Borden Co., New York, discussed the shell molding process. He described sizes and shapes of castings now being produced by

(*Concluded on page* 190)

SAINT LOUIS...

The St. Louis Union Station and famous Carl Milles Fountain, "Wedding of the Rivers". (Photo through the courtesy of the Chamber of Commerce of Metropolitan St. Louis.)

FOUNDRY MARKET AREA NUMBER EIGHT

In addition to being one of the most important industrial and transportation centers in the country, St. Louis is also a leading foundry market area. Metropolitan St. Louis, which includes the industrial section "across the river", boasts of 118 foundries, with over 17,000 employees and an annual production of some 659,000 tons of castings. There are many large foundries, 32 of which employ 100 or more people. Because they hold cleaning costs to an absolute minimum, you'll find ANNEALSHOT and/or SUPER-ANNEALSHOT in many of the area's 49 gray iron foundries.

Statistics from Penton's HOW TO SELL THE FOUNDRY MARKET

If economy and complete performance satisfaction are important to you in the use of abrasives, then you should consider the products of **Metal Blast, Inc.** *For information, write to 872 East 67th St., Cleveland 3, Ohio.*

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chilled shot and grit
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malleable shot and grit

CENTRAL ILLINOIS Chapter of the AFS held its seventh annual Stag Picnic, an "Old Time Barbeque," on June 13 at the 497th Engineers Club, Groveland, Ill. Shown above, from left to right, are George Garvey, City Pattern & Foundry, South Bend, Ind.; Fred. W. Wack, Central Pattern Co., St. Louis; Rudy Nimitz, City Pattern & Foundry; Otto Arneson, Arneson Pattern Co., St. Louis; Clayton Russell, Caterpillar Tractor Co., Peoria, Ill.; Frank Oklessen, Motor Patterns Co., Cleveland; and Jack Parker, Motor Patterns Co.

(*Concluded from page* 188)
this method and the types of metals cast successfully.

Mr. Herold pointed out two factors necessary for economic feasibility of shell molding: Sizeable production runs and elimination of finish machining. He cited one example of a shell molded casting being finish machined for $18 as opposed to a $27.40 machining cost when cast in green sand.

Mr. Herold showed slides and also exhibited some shell molds and cores. —*Don I. Huisenga, Albion Malleable Iron Co.*

Students Visit Indianapolis Foundries

Joe Gyarmati, in center, sand technician at National Malleable & Steel Castings Co., points out workings of a mold conveyor system to students

RECENTLY approximately 250 industrial arts students with their instructors from eight local high schools visited the following Indianapolis foundries: International Harvester Co., C. G. Foundry, Inter-State Foundry Co., Link-Belt Co., National Malleable & Steel Castings Co., Federal Foundry Co. and Electric Steel Castings Co.

The field trip was arranged through the activities of the Foundry Training Committee, a representative group of foundrymen and educators founded in October, 1951.

The group was divided into small units which allowed each one to spend time at the different foundries and provided the students with information on a variety of processes and production methods to apply to their technical training.

Upon completion of the tour, lunch was provided at the Link-Belt and National Malleable plants.

J. A. Barrett, one of the foundry representatives on the committee expressed surprise and pleasure that so many of the students were interested in the trip since it was conducted during the annual spring vacation. The success of this type of venture is best determined by its reception. Enthusiastic reports were received from the principals of the high schools involved.

In addition to the trips through foundries, the Foundry Training Committee, with the co-operation of the local foundry industry, has contributed funds for improving and supplementing equipment for teaching modern foundry methods in the local high schools.—*William H. Faust, Electric Steel Castings Co.*

Study of Foremen Reveals Pay and Job Variations

A pilot study of foremen's salaries and duties by National Foremen's Institute, New London, Conn., reveals that great differences in rank and pay go with the title of "foreman" and that an urgent need exists for better job evaluation in the middle management brackets.

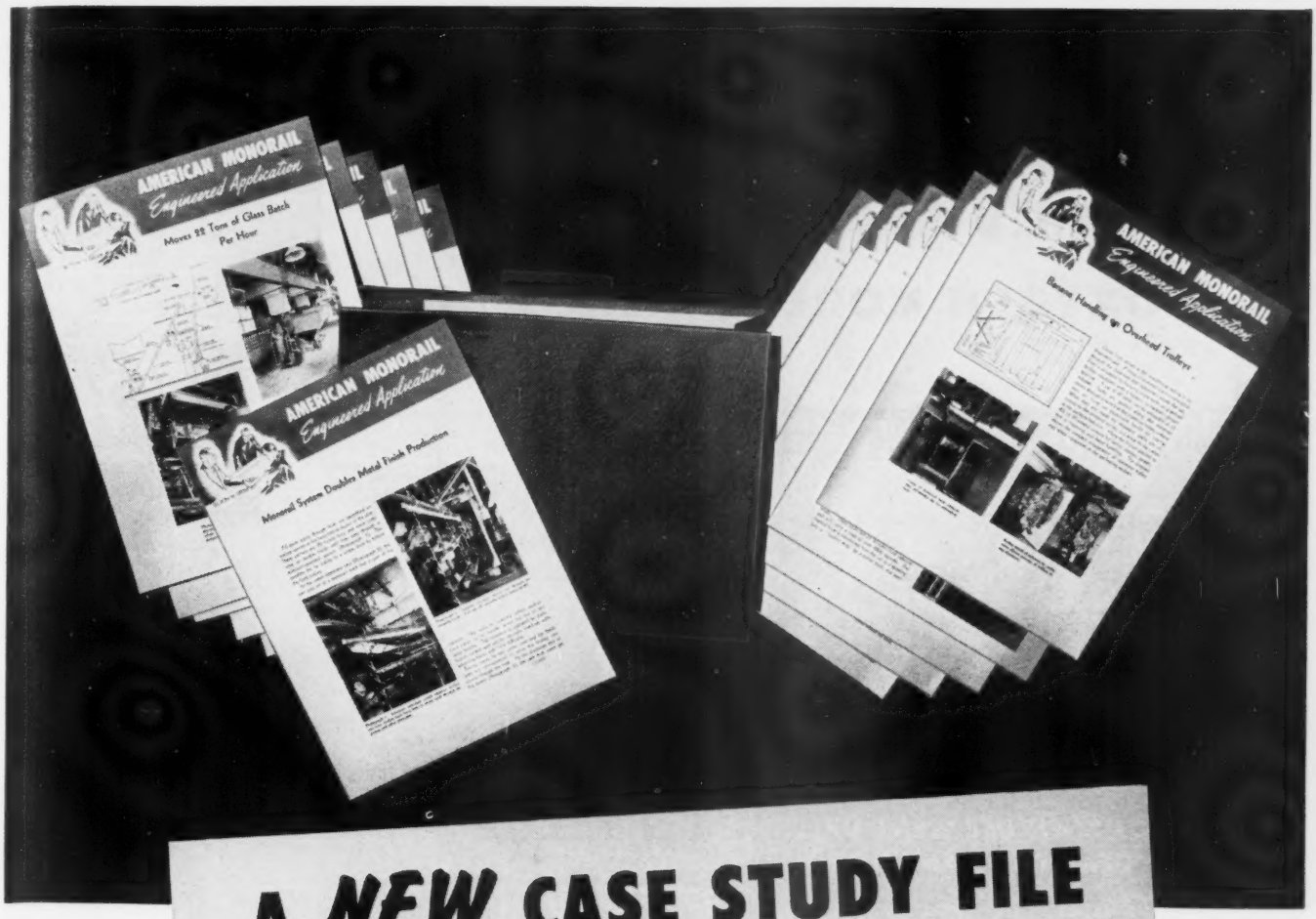
Salary data compiled from this research reveals a range of from less than $300 to over $700 a month for what the institute calls "Class I" foremen in the manufacturing field, with 48.1 per cent earning $450-525. Almost 80 per cent of those grouped in "Class II" earn $375-450. In non-manufacturing, paychecks are smaller —74.4 per cent of the upper groups are paid $375-475, and 68 per cent in Class II earn $300-400.

Job descriptions emerging from the survey reflect these differences in earnings without exactly paralleling them. The title "foreman" is applied alike to men who are veritable small businessmen and to men who are hardly more than monitors.

Book Review

ASTM Standards, Part 5, Fuels, Petroleum, Aromatic Hydrocarbons, and Engine Antifreezes, cloth, 1253 pages, 6 x 9 in., published by the American Society for Testing Materials, 1916 Race St., Philadelphia 3. Price $10.

Arranged in double-column format for easy reading, this latest section of ASTM Standards contains 212 standards and tentatives relating to fuels, petroleum, aromatic hydrocarbons and engine antifreezes. Those are presented under eight main headings including petroleum products and lubricants, ASTM engine test methods for rating fuels, methods of measuring and sampling petroleum and petroleum products, coal and coke, gaseous fuels, industrial aromatic hydrocarbons, engine antifreezes, and thermometers and general testing methods. Standards and tentatives are listed under the above specific headings, by numeric sequence, and in a detailed subject index.



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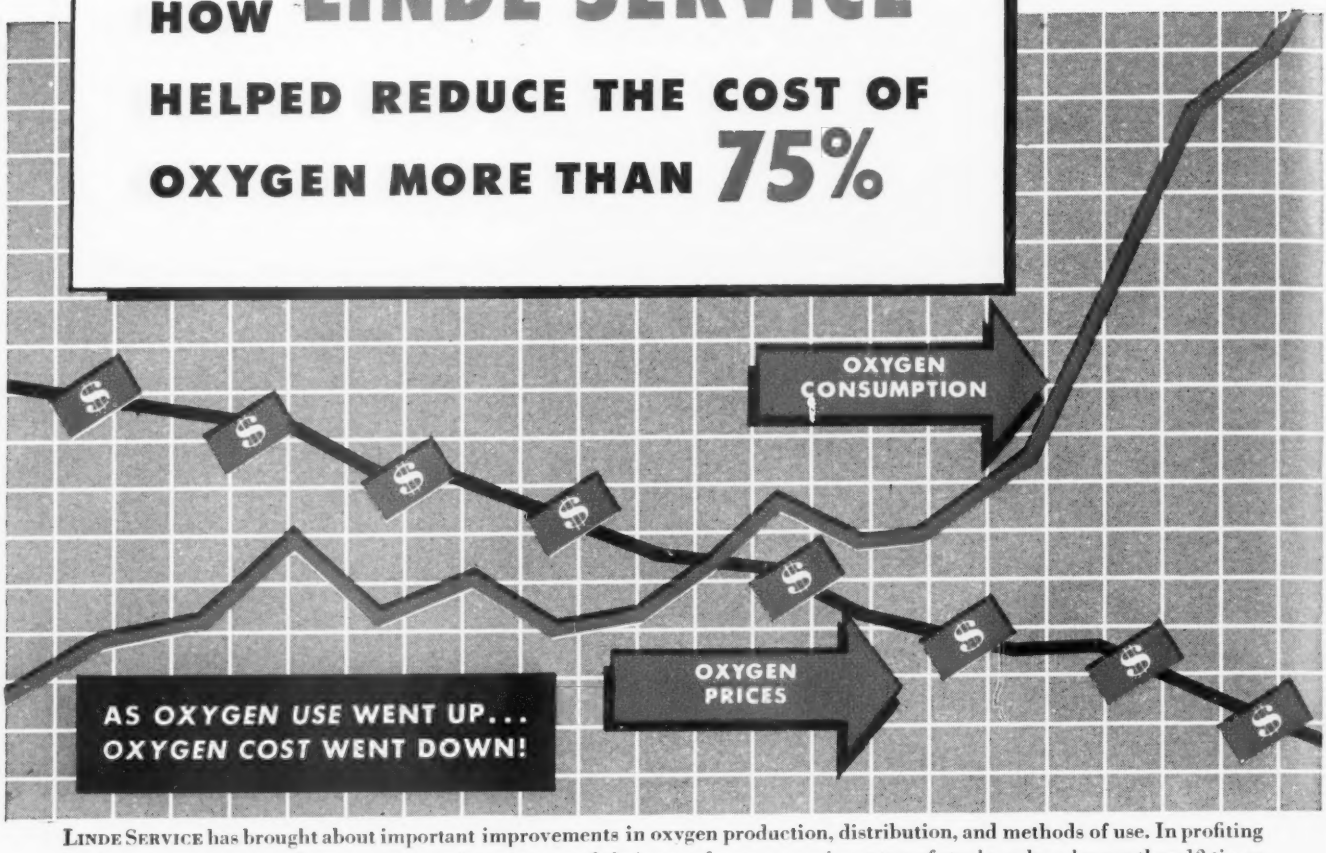

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Designing an Accurate

Immersion Thermocouple

By R. E. BISH
Materials Division
Westinghouse Electric Corp.
East Pittsburgh, Pa.

Assembled and exploded (left) views of thermocouple designed primarily for checking metal temperature in small electric furnaces commonly used in the investment casting industry

LARGE errors in a casting temperature can lead to severe unsoundness due to shrinkage and or gassing. An error in casting temperature of 10° C is not generally objectionable; however, when the desired pouring temperature approaches the liquidus temperature of the alloy, very slight changes in the actual pouring temperature can cause a considerable variation in grain size and in the high-temperature properties of an alloy.

The immersion thermocouple is the most acceptable means of accurately measuring molten metal temperatures. In the high temperature range considered, platinum-platinum, 10% rhodium thermocouple elements have long been recognized as standard because of their accuracy and stability. By the use of indicating and or recording instruments, errors of judgment by the operator are minimized and a reliable pouring record is obtained.

Design Problems — The principal problems encountered in development of an immersion thermocouple with Pt-Pt + 10 per cent Rh elements were:

1. Embrittlement or breakage of platinum or platinum-rhodium wires.
2. Short life of protection tubes.

Failure or breakage of Pt-Pt + 10 per cent Rh thermocouple wire occurs principally by intergranular corrosion (embrittlement) or by mechanical breakage. Mechanical breakage may be eliminated by securing the thermocouple rigidly in the holder.

Embrittlement of the thermocouple wire is caused by the intercrystalline attack of the platinum by silicon which forms platinum silicide, a low melting point constituent which is very brittle[1]. In order for the embrittlement to occur, the following four materials must be present: Platinum wire, SiO_2, carbon (acts as a catalyst), sulphur.

The mechanism of contamination has been proposed as follows:

1. Sulphur reacts with silica at high temperatures in the presence of carbon to form SiS_2 (a volatile silicon sulphide).

2. SiS_2 decomposes on contact with heated platinum and the silicon reacts to give platinum silicide while the sulphur is free to react with more silica.

It is possible to eliminate embrittlement by abolishing sulphur and/or carbon from the environment. This is accomplished by using very high purity porcelain separators and a protection tube free of sulphur and carbon.

The cost of thermocouple readings can be reduced by using less expensive materials for protection tubes and obtaining greater life from tube materials. Fused quartz was chosen because of its relatively low cost. Tube life is lengthened by preventing mechanical shock and by preheating (800° C) to reduce thermal shock on immersion. Mechanical shock is eliminated by a steel sheath that slides down and protects the quartz tube when the thermocouple is not in use.

The thermocouple assembly is shown in the accompanying illustration—an exploded view on the left and the assembled thermocouple on the right. The element consists of a 100-in. platinum—90 per cent platinum and 10 per cent rhodium thermocouple. The extra wire is positioned on either side of the thermocouple holder in a coil as shown. When a break occurs, a sufficient quantity of this wire may be drawn down and the hot junction re-welded with a minimum loss of wire. The insulated portion of the thermocouple element is placed in a 12-in. fused quartz protection tube, and the tube and element are fitted into the thermocouple holder.

Calibration — The effect of high temperatures upon the calibration of Pt-Pt + 10 per cent thermocouples was studied. It has been shown that rhodium distills out of the Pt + 10 per cent Rh wire when held above 1500° C[2]. The calibration is also disturbed when the wires are cold worked by routine handling. The thermocouple was only 4° C out of calibration after about 500 immersions, at between 1500-1600° C. At this time, it is desirable to clip off about one inch at the hot junction and anneal the wires.

Conclusions—Up to 30 immersions at between 1500 and 1600° C can be expected from one fused quartz tube depending upon the total soaking

(*Continued on page* 244)

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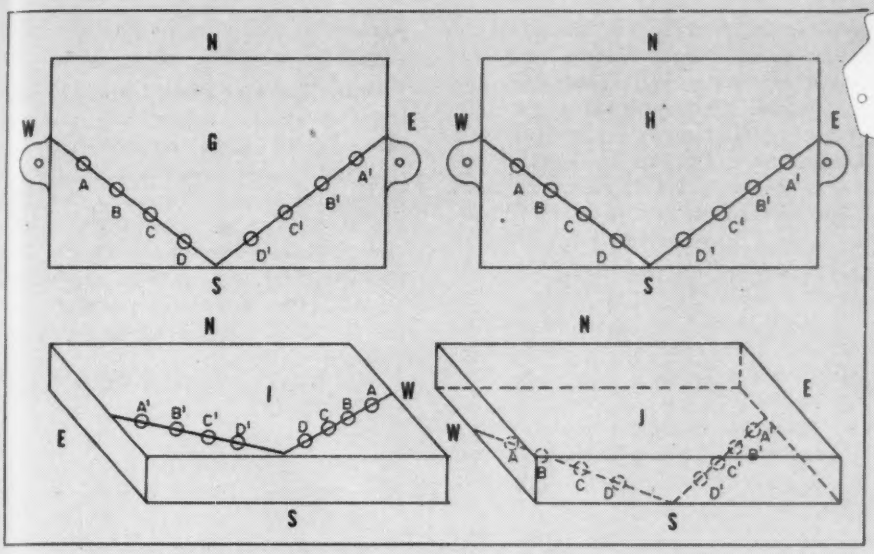


Fig. 1—Perspective and skeleton views illustrating the manner in which the drag and cope molds are made from the same plate and then assembled

ABC of Foundry Practice

Follow Boards and Matchplates

By PAT DWYER, *Engineering Editor*

SEVERAL methods are available for mounting patterns on plates. The best method depends on several circumstances — for example, whether the job is to be molded by hand or on a molding machine; the shape, size, thickness of the proposed casting; method of gating; number of machines available, etc.

Sometimes it may be advisable to use separate plates for cope and drag. On other occasions a double face matchplate may be the most satisfactory type of pattern. In many cases the best type of pattern plate is that in which the pattern or patterns are so arranged on one side of a plate that the resulting half mold may serve either as cope or drag.

On patterns that are symmetrical in length, width and thickness and that are attached truly on two intersecting center lines on the plate or board, the cope impression of the mold will fit on the drag impression irrespective of whether the cope is closed *right-end-to* or *end-for-end*.

Patterns of irregular shape mounted on a plate designed to form both cope and drag mold must be arranged so that when the mold is closed, the impression made close to the right end of the cope will coincide with the impression made in the left end of the drag before the drag was rolled over. Intervening impressions on both sides of a transverse center line will *match up* in a similar manner.

With certain types of patterns and under certain conditions it may be advisable to arrange the patterns on both sides of a longitudinal center line. In these instances it is not necessary to turn the cope end for end before placing it on the drag. The mold impression from one side of the plate will fit over the drag impression on the opposite side, but the ends of the cope and drag retain the same relative position in which they are rammed on the plate.

Sketches *G*, *H*, *I* and *J* in the accompanying Fig. 1 show how the patterns are arranged and how molds are made and matched on one of these plates. The sides and ends of the plate and corresponding sides and ends of the half molds are marked *N*, *S*, *E* and *W* (North, south, east and west to simplify the explanation.)

The pattern plate is shown twice, at *G* and *H*, so that the reader may more easily understand the position of the two half molds, drag and cope, *I* and *J*. One half of each split pattern *A*, *B*, *C* and *D* is fastened to the plate as shown between the west end of the plate (*W*) and the transverse center line. The corresponding half of each pattern is attached to the plate as shown to the right between the center line and the east end of the plate (*E*). For further identification the group of half patterns to the left is marked *A*, *B*, *C* and *D*, while the group to the right is marked *A'*, *B'*, *C'* and *D'*.

In operation, the drag first is rammed on the plate, lifted off, rolled over and turned end for end. It then will be in the position shown at *I* with the pattern impressions on the upper or face side, but with the relative positions of the letters reversed. It will be noted that the north and south sides of the mold, still are north and south, but the east and west ends have changed places. The

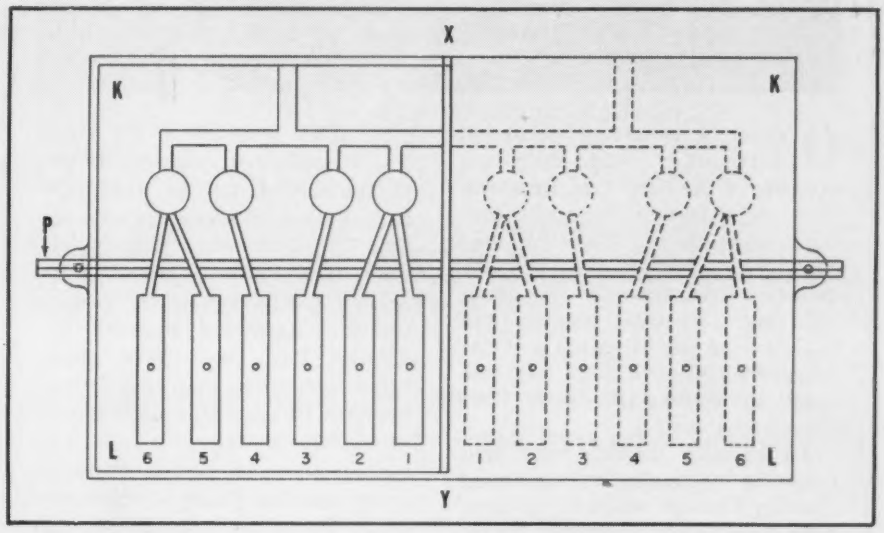


Fig. 2—Layout showing the manner in which a transfer plate is employed to locate patterns on the plate designed to form both the cope and drag

mold impressions from the patterns *A*, *B*, *C* and *D* now are at the right in the block of sand.

The cope then is rammed on the same plate, shown above at *H* merely for simplicity. It is lifted off, but is neither rolled over nor turned end for end. It is placed directly on the drag. By comparing the two views *I* and *J* with the mold impressions on the upper face of *I* and the mold impressions on the lower face of *J* it will be seen that *A* will come over *A'*, *B* will come over *B'*, *C* will come over *C'* and *D* will come over *D'*. Corresponding cavities in the remainder of the two half molds will match in a similar manner.

Here's How It's Done—The following description refers to a set of pattern plates made to the order of a foundry engaged in the production of nonferrous castings for sanitary application. The customer wanted to make the molds horizontally in the usual manner, but he intended to turn the closed molds up on edge and pour the metal into them in that position. That accounts for the position of the sprues, gates and runner in Fig. 2.

Having decided on the position the gates and patterns were to occupy on the plate, full-size layouts were made showing the castings in section, so that a close check might be held on the metal thickness; also as a guide in forming the first master patterns and dummy cores of wood.

Pattern plates were cast iron, approximately 1 in. thick, accurately planed on both sides and of a size to take a flask 12 x 18 in. Suitable pin holes were drilled in lugs at both ends. Afterward hardened steel bushings were pressed into the holes to anticipate the inevitable wear. By renewing these bushings when necessary, an accurate match is insured between cope and drag half molds made on the plate.

Split wood patterns were made for all the parts designed to be molded partly in the drag and partly in the cope. Only one wood master pattern was made for each piece, but in many instances several metal patterns, also in halves, were made from the wood half patterns. The first wood pattern was dimensioned for double contraction, so that the ultimate castings made from the plate would be the right size.

The half patterns cast in bronze were matched in pairs, brazed together on the joints and finished as units. Wherever possible the finishing was done on machine. Units then were drilled for dowel pins and for screw holes by which they were to be attached to the plate. The halves were parted and one half of each pattern was placed in the desired position on the first half of the cast iron pattern plate.

Brass Transfer Plate Used—At this stage a special device was brought into play to locate the half patterns so that the corresponding halves would be located properly on the second half of the plate surface. The method will be understood more easily by referring to Fig. 2, which shows a brass transfer plate located by the center lines on the pattern plate.

The transfer plate is made up of three members, a central strip *P* 3 in. wide with a hole near each end to fit over pins in the pattern plate lugs, and two plates *K* and *L*, each large enough to cover approximately one fourth the area of the pattern plate. These two plates are soldered to the central bar *P*. Eventually they become so filled with holes, they are of no further use. They are removed and a new pair soldered in their place. The central bar lasts indefinitely. It has to fit accurately over the pins and is the part responsible for the accurate location of the pattern halves on the second or right side of the plate as it appears in the illustration.

Assuming that the transfer plate is in position the first set of half patterns and gates are located as shown in the left half of the illustration. They are spaced properly according to the judgment of the patternmaker, or in accordance with instruction from the foundry, or from a blueprint. Melted wax is spilled all around them to a thickness of approximately ⅛ in. to hold them in place while a small drill is passed through the dowel holes, through the transfer plate and through the iron plate beneath.

The reason for drilling the holes through the iron plate is that a drift pin or nail set may be employed to drive the pins backward in the event it becomes necessary later to remove the pattern from the plate, for changes, repairs or for any other purpose.

Iron plate, transfer plate and patterns are placed on the table of a drill press. The holes may be drilled by hand, but except in the hands of an extremely skilful man, the method is not so accurate as when the holes are drilled on a machine. In fact, unless the machine is in perfect condition, the holes may vary more or less from a true perpendicular, with a consequent shift in the position of the second half of the pattern layout on the second or right end.

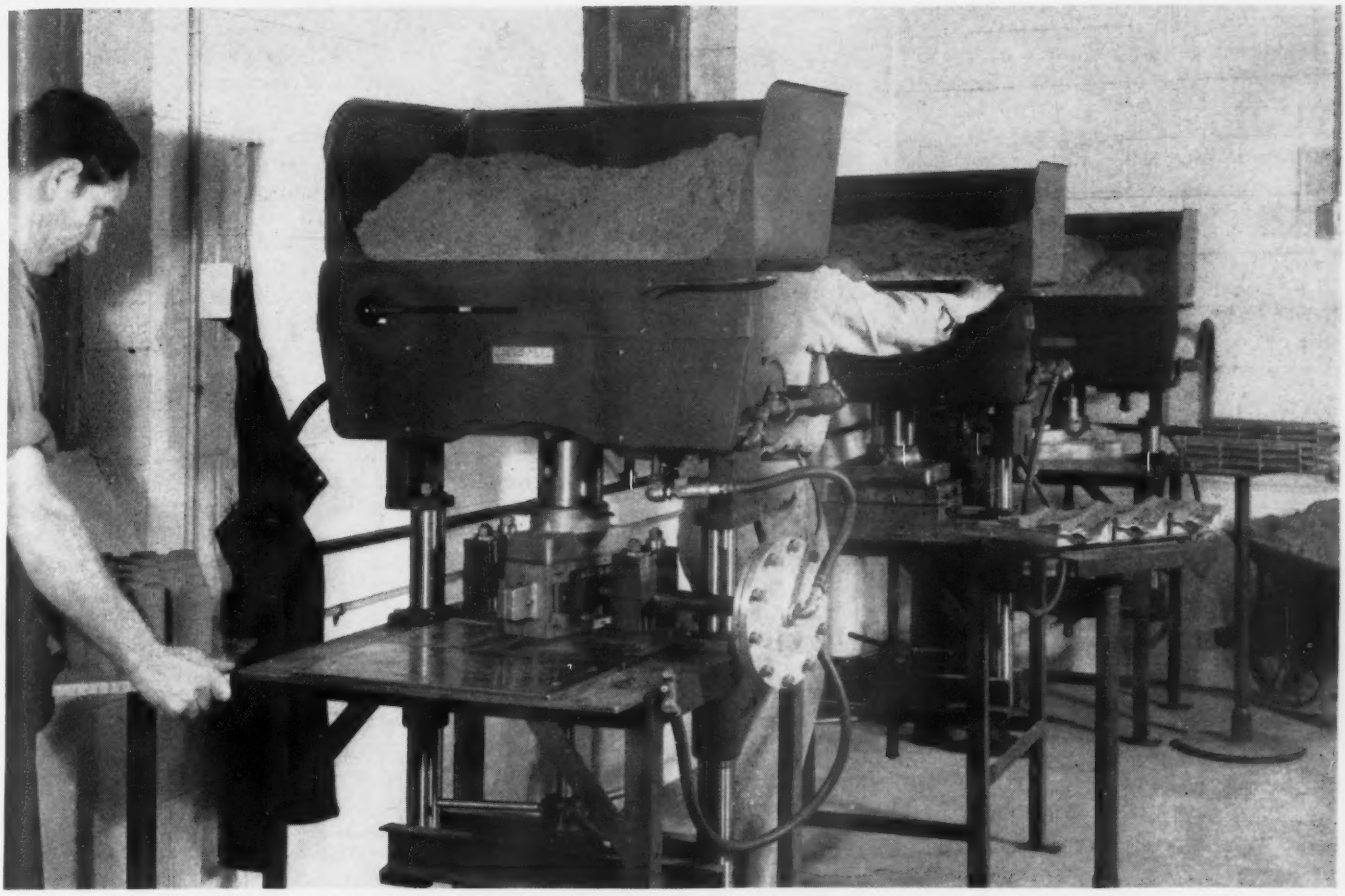
After all the holes are drilled, the half patterns and wax coating are removed from the face of the trans-

(*Concluded on page* 199)

Gray Iron Research Group Meets at Cleveland

OVER 70 operating personnel attended the 42nd operators meeting of the Gray Iron Research Institute at Hotel Cleveland, Cleveland, June 11-12. Technical sessions covered evaluation of coke quality, developments in green sand and core sand practice and the development of gating and risering principles. A half day was spent in visiting the new Ford Cleveland Foundry.

An evening meeting was held following a dinner at Westwood Country Club at which W. L. Seelbach, Superior Foundry Inc., Cleveland, related some of his experiences while president of the American Foundrymen's Society. Shown at the dinner, left to right, are: C. L. Seelbach, Forest City Foundries Co., Cleveland; W. L. Seelbach; D. E. Krause, Gray Iron Research Institute; K. A. Nelson, Chicago Hardware Foundry Co., Elkhart, Ind.; Dave Clark, Forest City Foundries Co., and Frank Sherwin, Chicago Hardware Foundry Co., North Chicago, Ill. Mr. Nelson is chairman of the operators group and Mr. Clark is vice chairman. Photo courtesy Harold Wheeler, Superior Foundry Inc.



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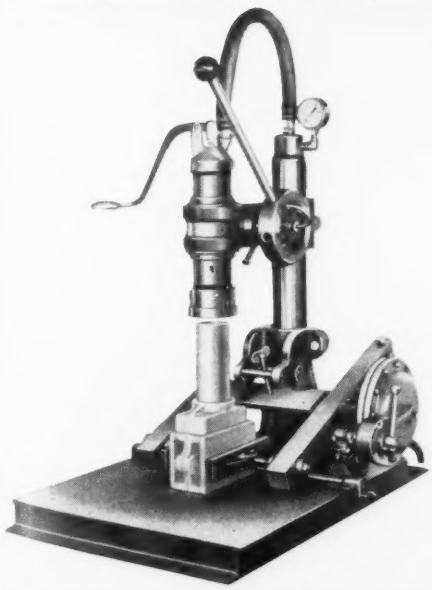

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(*Concluded from page* 196)

fer plate. The plate then is turned over and replaced on the iron pattern plate with the recently waxed face next to the iron. However, it is not sufficient to turn the transfer plate upside down. It must be turned so that the ends alone change places. The plate must be turned on an imaginary axis *XY* and *not* on a longitudinal axis. The process is shown in the illustration, where the plate is shown in full line in the first position at the left and in dotted lines in the second position on the right.

In the second position the transfer plate serves as a jig in drilling the iron pattern plate. It is apparent that when the transfer plate is turned over and turned end for end the relative position of all the patterns will be reversed to correspond as indicated by the numbers 1, 2, 3, 4, 5 and 6.

Attaching the Half Patterns—Having drilled all the necessary holes on the second or right half of the pattern plate the patternmaker removes the transfer plate and proceeds to attach the half patterns to the iron pattern plate. A pin made from brass rod is driven through each dowel hole and into the hole in the iron plate. The rod is a tight fit and holds the pattern firmly in place. A screw is inserted in a special hole drilled through the pattern and drilled and tapped in the iron plate. After the screw is driven down firmly below the surface, the cavity over the head is filled with solder and the surface is smoothed over to conform with the remaining surface of the pattern.

Making a Corebox—Method of making the iron corebox is slightly different than that employed in preparing the patterns. A wood block, split in two, is made the exact size and shape of the desired core. Each half is placed flat face down on a board or plate and surrounded with a light wood frame. The frame is filled with plaster. After the plaster has set, the pattern is removed from the front side. The back and sides of the plaster block are carved to the desired shape, to reduce the total mass. The plaster blocks, one right, one left serve as patterns for metal replicas.

Each half corebox is planed on the face and the core cavity is finished carefully by hand. Next stage of the process is to match the two halves in such a manner that the assembled box will produce a symmetrical core. A lead core is poured into each half corebox. The two half lead cores are soldered together face to face to make a complete core. This core then is placed in one half of the corebox. The second half corebox then is placed over the exposed half core and automatically is guided into proper position. While in this position suitable pin holes are drilled through both half coreboxes.

In the final test, a half mold is made in plaster and a core is made from the same material. The core is fitted in the mold and, if necessary, minor adjustments may be made before the coreboxes and patterns are sent to the foundry where the patterns are made and where later a sample set of castings is made.

Organize Pattern Works

Progressive Pattern Works Inc. has been organized in Du Plainville, Wis., with a capital stock of 1200 shares of common of no par value. Incorporation papers were signed by Richard L. Dost, 1014 East Meadow Place, Whitefish Bay, Milwaukee 11.

How To Do It . . .

Special Frame for Molding Machines Holds Quick Change Pattern Boards

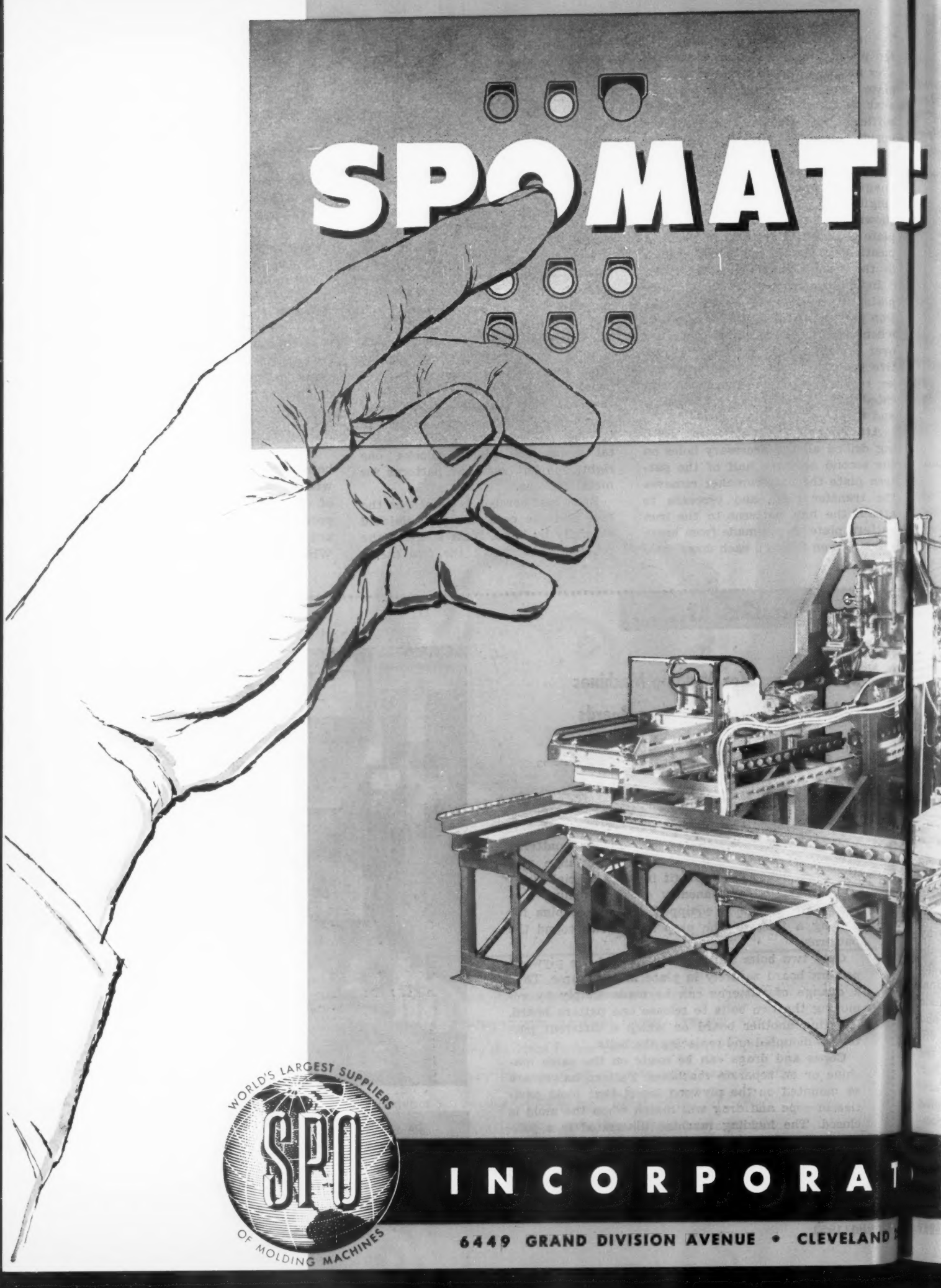
By L. D. PRIDMORE, *president*, International Molding Machine Co., La Grange Park, Ill.
as told to
ROBERT H. HERRMANN, *associate editor*

FOR SHORT run molding jobs, different patterns are mounted on standard-size, quick-change plywood insert boards which fit inside a special metal frame mounted permanently on the molding machine. The frame is equipped with guide pins for holding a flask in the proper position around the patterns.

Only two bolts are required to hold the plywood pattern board securely in place in the frame. Thus a change of patterns can be made simply by removing the two bolts to release one pattern board, inserting another board on which a different pattern is mounted and replacing the bolts.

Copes and drags can be made on the same machine or on separate machines. Pattern halves are so mounted on the plywood insert that mold cavities in cope and drag will match when the mold is closed. The molding machine illustrated is a jolt-squeeze, pin push-up model, and the permanently mounted frame is cast steel. Obviously, only one size flask can be used with any given frame.

Do you have any tricks of the trade tucked away with your foundry experience? Why not release them to fellow foundrymen? FOUNDRY will pay a minimum of $10 for each idea submitted and published. Send a photo or drawing with your idea



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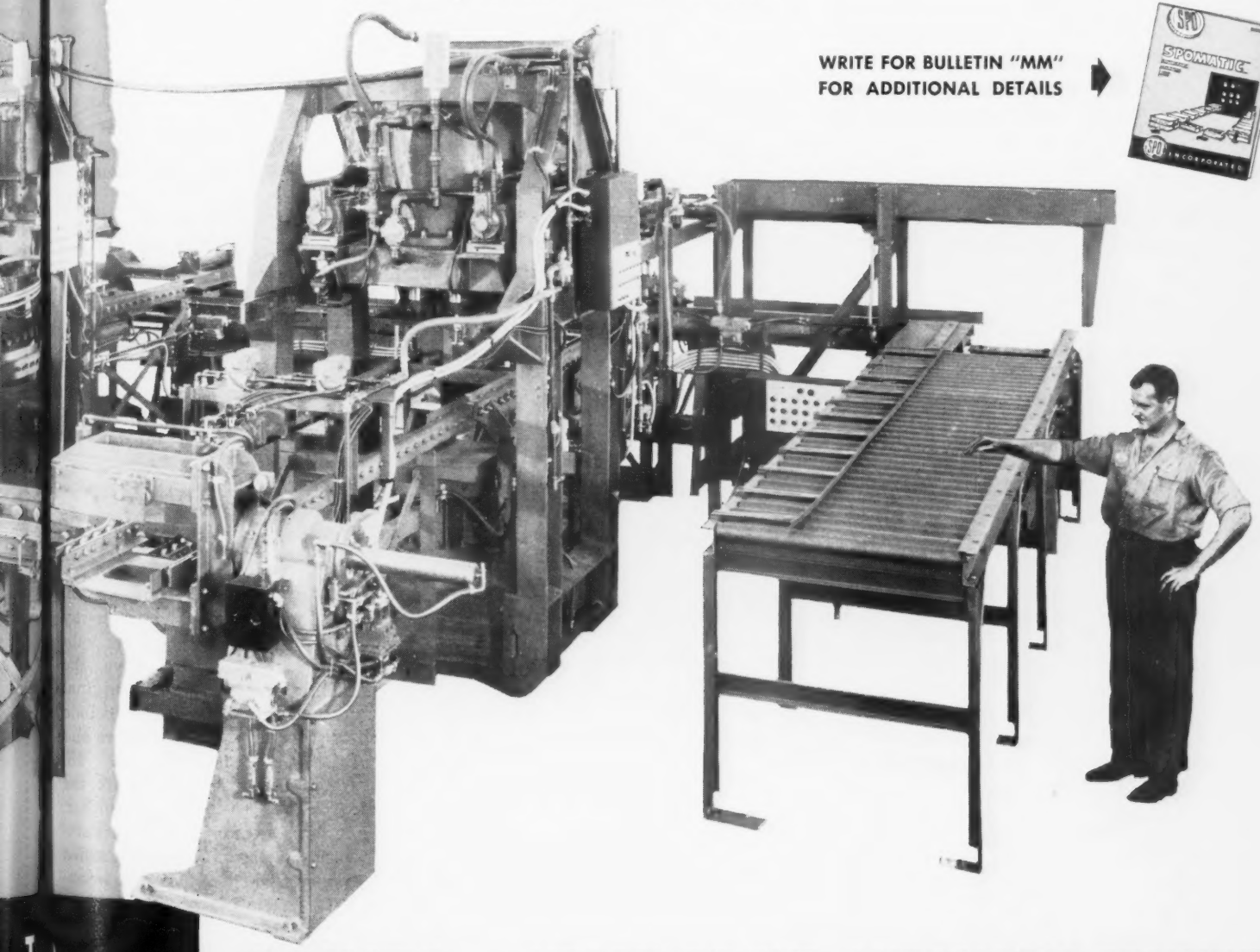

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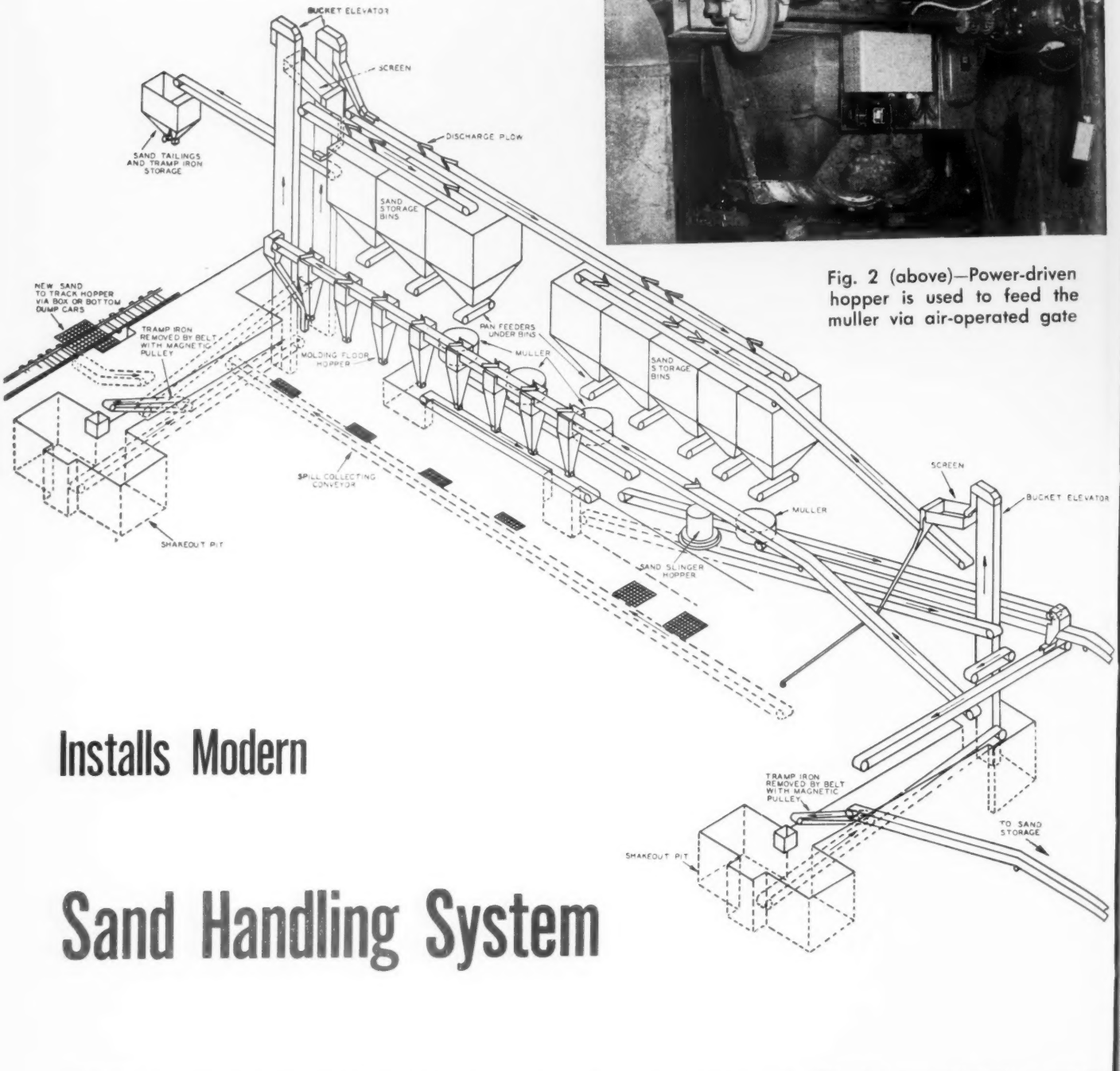
Fig. 1 (below)—Layout of the system for handling sand at Riverside Foundry Inc., Bettendorf, Iowa



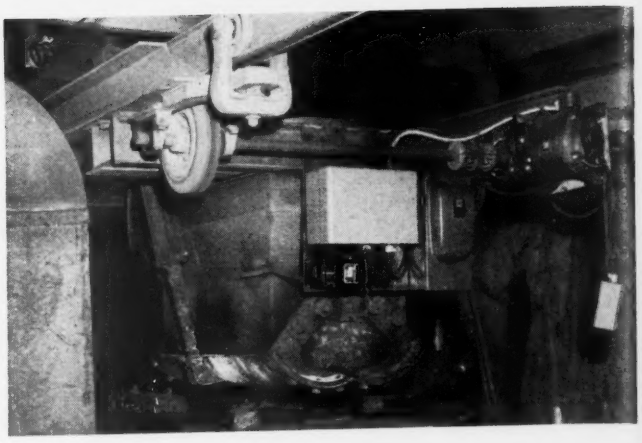


Fig. 2 (above)—Power-driven hopper is used to feed the muller via air-operated gate

Installs Modern

Sand Handling System

IN THE course of a two-year $4,000,000 expansion program Riverside Foundry, Bettendorf, Ia., has added a complete new steel foundry to the existing gray iron foundry. Each foundry is a totally independent unit operating under the same large roof. With this added facility it is claimed the plant is the largest independent steel and gray iron foundry in the middle west.

The original plant, formerly operated by the Zimmerman Steel Casting Co., was purchased from the War Assets Administration in 1946 and converted into a production gray iron foundry. In the intervening years production facilities have been doubled and now occupy 200,000 sq ft of floor space.

The plant is conveniently situated at the crossroads of north-south, east-west shipping routes, ideally located to supply steel and iron castings to all parts of the nation. The Mississippi river affords north-south shipping facilites. Four prominent railroad lines serve the area. Rapid cross country trucking service is available at all times.

In addition to installation of electric melting and heat treating furnaces, the expansion program included a completely mechanized sand conditioning and distribution system, chemical, metallurgical and x-ray laboratories. Two new electric substations were added to serve the many motors, now triple the original number. Handling facilities include a number of long roller conveyors and several short connecting units. Jib cranes and monorail cranes lift the molds from one conveyor to another. Cores from the coremaking department arrive on tiered flats suspended from an overhead crane. An elaborate belt system carries mulled sand to the various molding stations, including a sandslinger unit.

Molding and core sand handling

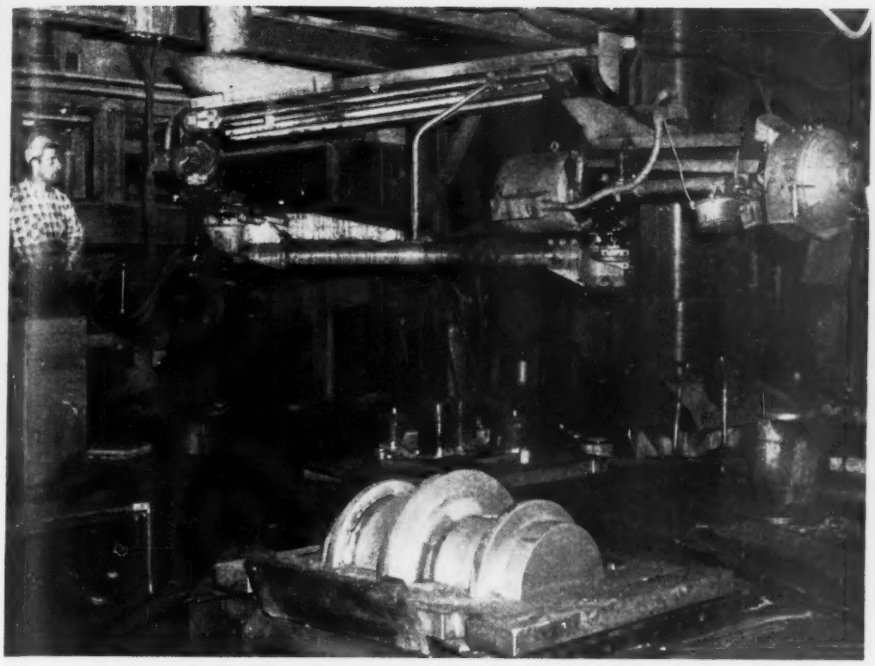


Fig. 3—Molds are rammed by sandslinger while revolving on turntable

equipment includes nearly a quarter mile of 24-in. belt conveyors, also pan conveyors, bucket elevators, conveyor elevators, bins, gates and a power shovel for unloading box cars. All the extensive new equipment was installed without interrupting normal production operations on the foundry floor.

The new conveying system completely eliminates manual handling of molding and core sand, introducing new sand to storage bins from a rail siding and recirculating sand from the shakeout pits and molding floors. Core sand binders and other components are lifted to overhead bins by an elevating conveyor. Eight hoppers feed sand to the molding machines on the foundry floor. A ninth hopper feeds the sandslinger. Spilled sand is dumped through grated floor openings onto a collecting belt under the floor. This belt discharges onto another and the sand eventually arrives back to the hoppers over the molding machines. Eight storage bins for new and shakeout sand have combined capacity for 1010 tons of both types of sand.

The entire sand handling system was designed by J. A. Avdek, plant engineer, and was detailed, constructed and installed by Stephens-Adamson Mfg. Co., Aurora, Ill.

First component of the sand system is the south shakeout, Fig. 1, left, from which the sand passes to a 24-in. belt conveyor and is discharged into the boot of an 8 x 16-in. bucket elevator. The elevator discharges the sand at the top into a 5 x 10 ft vibrating screen. A belt under the screen carries the sand and discharges it into the large storage bins. Waste sand and tailings from the screen are discharged onto a 24-in. belt, which carries this material to a hopper located outside the building at a height to permit a truck to be spotted beneath for removal of the hopper contents. A magnetic pulley removes tramp iron and steel.

Second component is the north shakeout, lower right same illustration, where the sand from the shakeout flows on a 24-in. belt to the bottom of an elevator, then from the top into a 5 x 10 ft vibrating screen and on to a 24-in. belt which discharges into any one of the storage bins. In this component tramp iron is removed by a magnetic pulley. Tailings from the vibrating screen are discharged into a chute and on to a salvage belt which discharges over one end into a hopper and through a gate into a truck.

In a third component three sand mullers receive sand from the overhead storage bins by two traveling batch hoppers fed by pan feeders underneath the storage bins. These mullers prepare the sand for the molding machine hoppers and sandslinger. Two pan type mullers prepare sand for the coreroom. Any muller may be loaded from any combination of the storage bins. Each muller is provided with two discharge doors that open on to two different belts. With this arrangement sand may be taken from any of the three mullers and delivered either at the north or south molding stations. Mulled core sand is carried by belt to the coreroom hopper and from there distributed to various points in the coreroom.

An indoor track hopper, far left, receives new sand directly from bottom door railroad cars. From this hopper it is carried by belt to a bucket elevator and on to a belt which discharges sand into the storage bins. Additional overhead bins, not shown on the drawing, are located between the two groups of storage bins. These additional bins are filled with molding sand bond material by an elevator conveyor from the ground level. A traveling batch hopper carries the bonding material to the speedmullers.

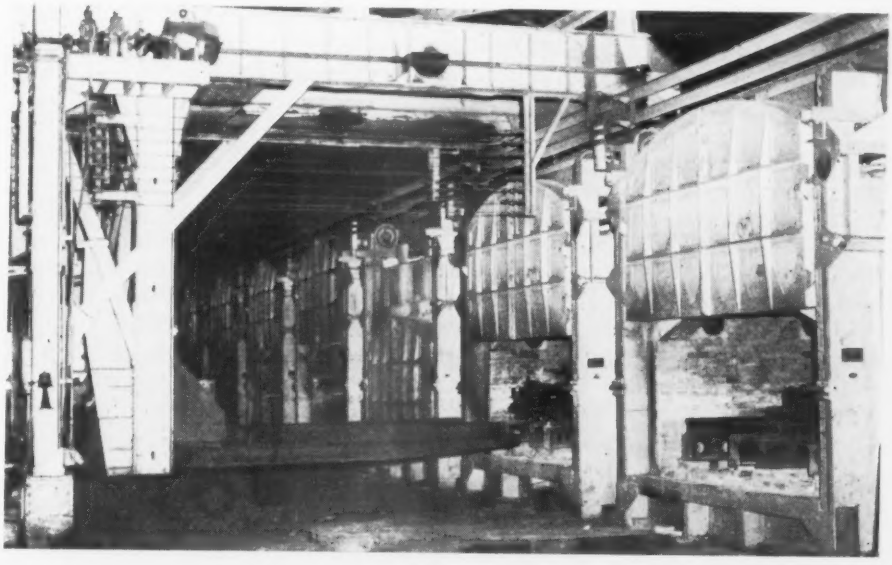


Fig. 4—Multiple-batch heat treating furnace with charging crane

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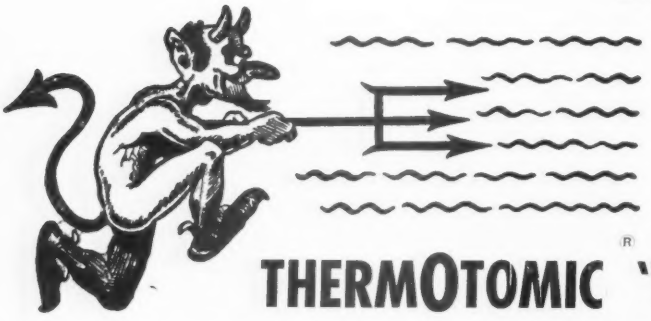

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NOTE: SOFFEL'S CARBON FREE LIQUIDIZER NO.5 is recommended for use on top of feeding heads in conjunction with THERMOTOMIC COMPOUND. For aluminum castings, use THERMOTOMIC ABC and AL-X31 LIQUIDIZER. When ordering a trial sample, advise the kind of metal to be used on.

U. S. Patents No. 2,490,327 and No. 2,500,097

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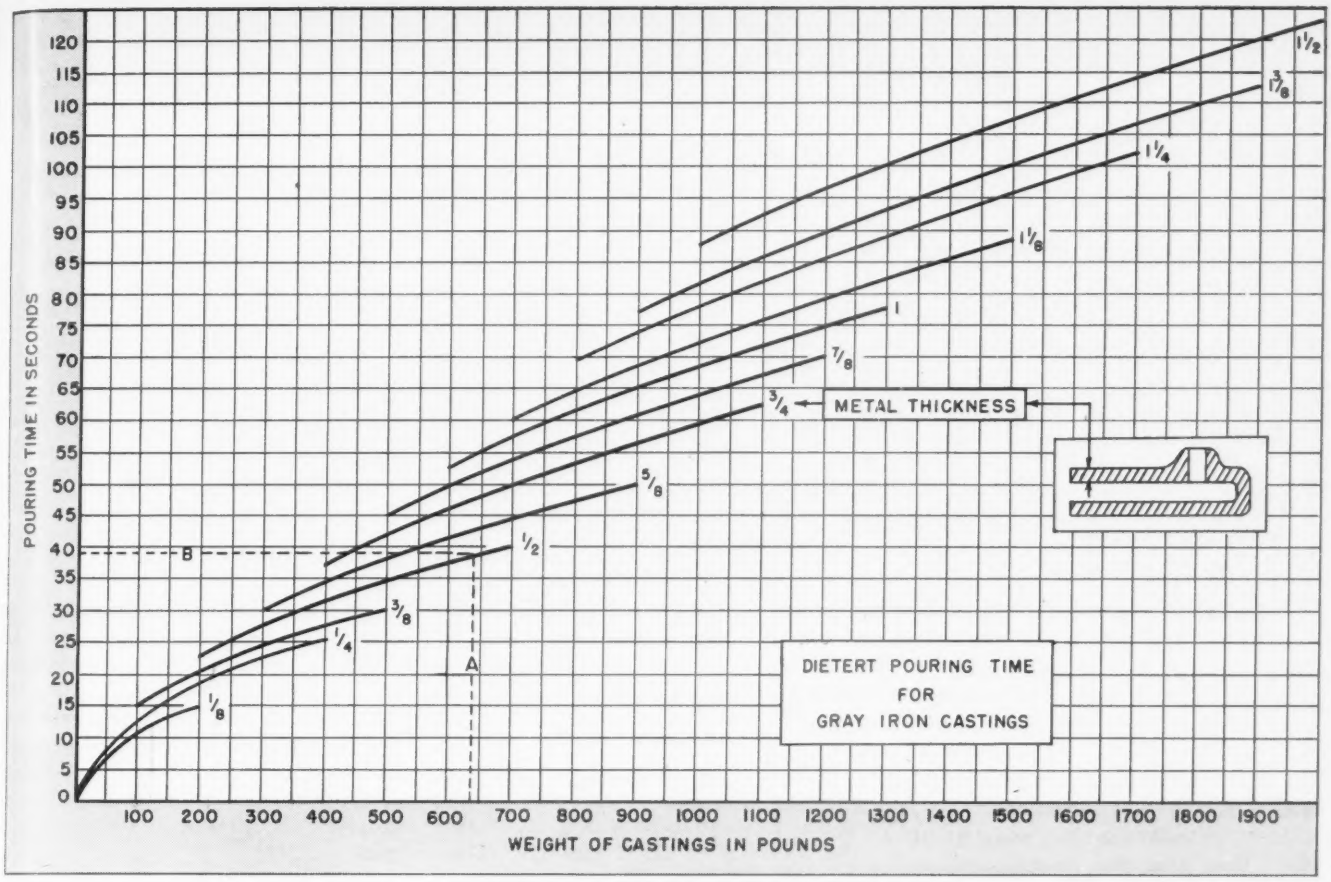


Fig. 1—Chart for determining pouring time for gray iron. For example, a casting weighing 630 lb with ½-in. metal thickness: Follow vertical line A to ½-in. curve, then horizontally B to pouring time—in this case 39 sec

How Fast Should a Mold Be Poured?

By HARRY W. DIETERT
President
Harry W. Dietert Co., Detroit

FOUNDRYMEN frequently reach a point at which they apparently cannot improve their castings further with the personnel and funds at hand. At such a time, when the desire to progress is still present but the next move is not clear, pouring time for castings should be studied.

This step is advisable because good castings are made in foundries that have good control in all departments, not in one or a few. The degree of control exercised in one department influences the work of the others. Thus an improvement in metal or in melting temperatures eases the job of control in the sand department just as, conversely, a good sand department makes control easier for the metal department and for others.

The rate at which metal enters a mold influences these factors: The rate of metal solidification between heavy and light sections of a casting; the cutting action of the metal on the mold surface; the mold-sand wall movement; and the care with which a mold must be rammed. Consequently, pouring a casting for the optimum length of time improves its quality even though no other changes are made in the foundry. The Dietert pouring time formula for gray iron castings presented here has helped to improve casting quality in a number of foundries.

Pouring time can be expressed in seconds required to pour a casting. To plot pouring time for any specific metal, a foundryman should plot pouring time for castings of a given general thickness versus casting weight. Pouring time which the writer has found beneficial for gray iron castings can be calculated by the formula D:

$$\text{Pouring time (seconds)} = \left(A + \frac{T}{B} \right) \sqrt{W}$$

In this formula,

T = Average metal thickness of casting in inches, expressed in decimal form

W = Weight of casting in pounds

A = 0.95 for gray iron

B = 0.833 for gray iron

For example, if a casting weighs 400 lb and has an average metal thickness of 0.50 in., the formula will read as follows:

$$\text{Pouring time} = \left(0.95 + \frac{0.50}{0.833} \right) \sqrt{400} = (0.95 + 0.60) \times 20 = 31 \text{ seconds}$$

The A + T/B value in the formula also can be determined for gray iron from the graph shown in Fig. 2. Dietert pouring time for gray iron castings can be determined quickly with the chart in Fig. 1, which has a pouring curve for casting thicknesses ranging from ⅛ to 1½ in. Casting weight ranges up to 2000 lb. The chart is used in this fashion:

If a casting weighs 630 lb and has an average metal thickness of 0.50 in., start at the bottom line of the chart at 630 lb and project a line

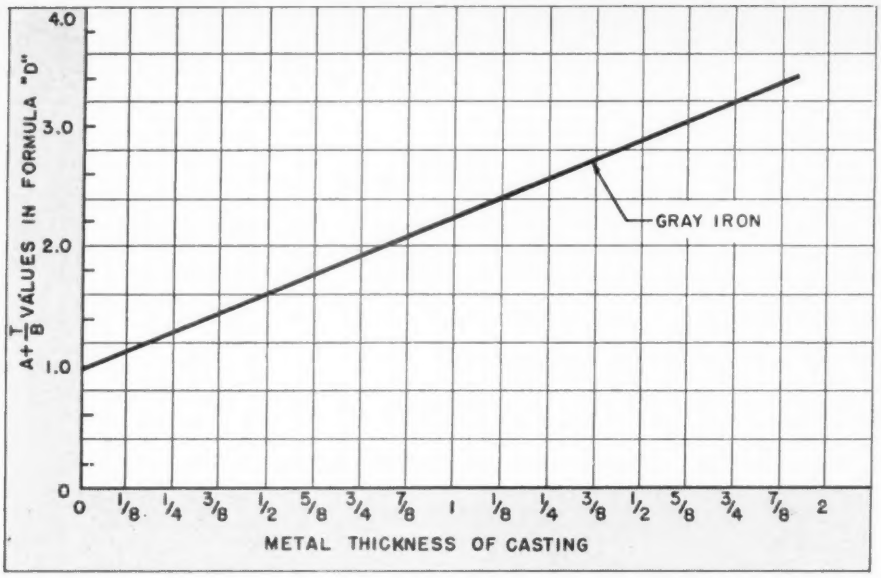


Fig. 2—This graph may be used to determine for gray iron the values of A+T/B used in the formula for calculating optimum pouring time

vertically until it intersects the pouring curve for the ½-in. metal thickness. Then proceed horizontally to the left vertical scale, where pouring time is shown to be 39 seconds.

This method can be adapted to other than gray iron castings by using a stop watch to time a group of castings poured with a given type of metal. Pouring time, casting weight and metal thickness should be recorded. Then a graph similar to Fig. 2 should be used to plot pouring time curves for each metal thickness, using only the pouring time from castings that are produced at a good loss rate. Sufficient data can be gathered quickly by this practical approach to formulate a pouring chart for a particular metal.

Size of Gate—The proper area of gate required to secure the Dietert pouring time may be found by the cut and try method or, preferably, by a calculation of the exact size.

The first step is to determine the effective sprue height or the ferrostatic pressure on the gate. The effective sprue height can be calculated by formula ESH:

Effective sprue height = $(2HC - Ca^2) \div 2C$

In this formula,

H = Distance of the gate from the top of the mold in inches

C = Total height of the casting in inches

Ca = Height of the casting above the gate in inches

The mold diagrams, Fig. 3, show the meaning of H, C and Ca. The second step is to calculate the area of the gate by using formula E:

Area of gate (sq in.) = $X \sqrt{W} \div \sqrt{ESH}$

In this formula,

W = Weight of casting in pounds

ESH = Effective sprue height obtained from formula ESH

X = 0.23 × T ÷ 2.22 for gray iron, with T equal to the thickness of the casting

As used here, the term "gate" refers to the ingate at the casting, unless the gating system contains a choke ahead of the ingate. If such a choke is used, effective sprue height must be calculated from the choke to the top of the mold, not from the ingate.

Summary—The graph shown in Fig. 1 is a practical tool for gray iron foundrymen and should help to reduce the effort required to produce high-quality gray iron castings. The effective sprue height and area of gate formulas help to cut the time required to place castings in production by reducing time for experimentation with gate construction.

Reference

Dietert, H. W., "On Gating Iron Castings," *Transaction*, AFS, Vol. 34, pp. 1038-1048.

Revise Booklet About Dangers of Lightning

A new edition of *Code for Protection Against Lightning,* National Bureau of Standards Handbook 46, superseding H40, has been issued by the National Bureau of Standards, U. S. Department of Commerce. It is sponsored jointly by the National Fire Protection Association, the American Institute of Electrical Engineers and the NBS.

In addition to including material revised from previous handbooks, the 91-page volume contains information on aluminum as a suitable material for lightning protective systems; on new rules for grain elevators and for vents and stacks emitting explosive dusts, vapors or gases; and on detailed specifications for lightning rods.

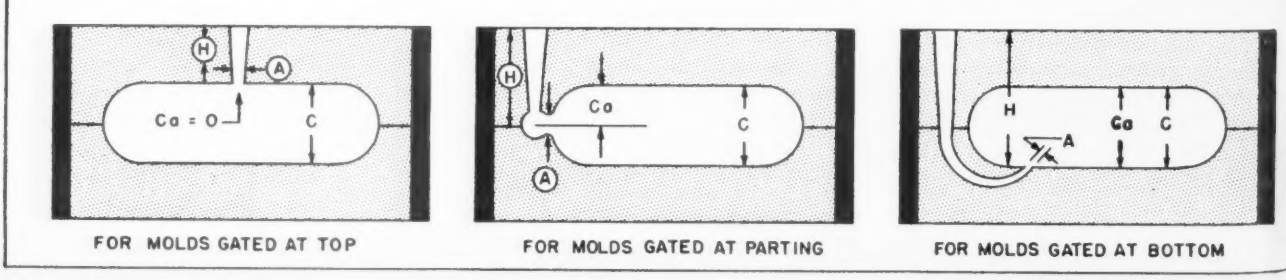
The booklet may be ordered at 40 cents per copy from the Government Printing Office, Washington 25, D. C. Foreign remittances must be in U. S. exchange and should include an additional one-third of the publication price to cover mailing costs.

Book Review

Drafting by the Model Method, by John B. Musacchia, Henri A. Fluchere and Melvin J. Grainger, paper, 143 pages, 8½ x 11 in., published by Arco Publishing Co., New York. Price $3.50.

Designed to be a complete course in drafting, this textbook uses a "model method" of instruction. Cutout, three-dimensional models accompany the illustrated text, all components of which have been planned as essential steps in the training of competent draftsmen. A clothbound edition is available for $5.

Fig. 3—Illustrating the various dimensions required to be incorporated in one formula employed in determining the proper area of casting gate

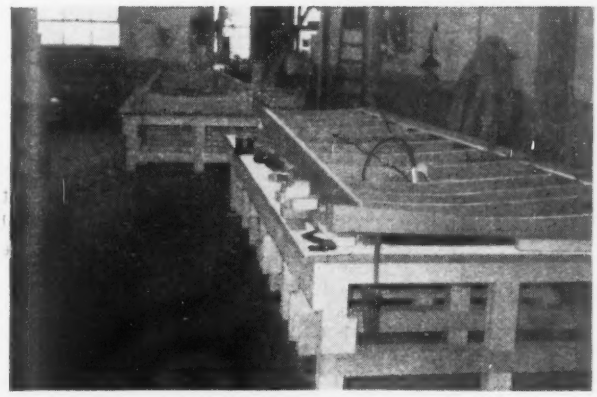


Craftsmanship....

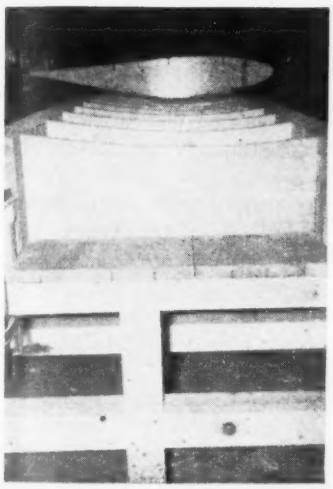
SOLVES ANOTHER TOUGH ONE

JOB:

An aircraft wing fixture. Four sections, each fourteen to sixteen feet in length. Five to six feet in width. Hardwood construction held to .005" tolerance.

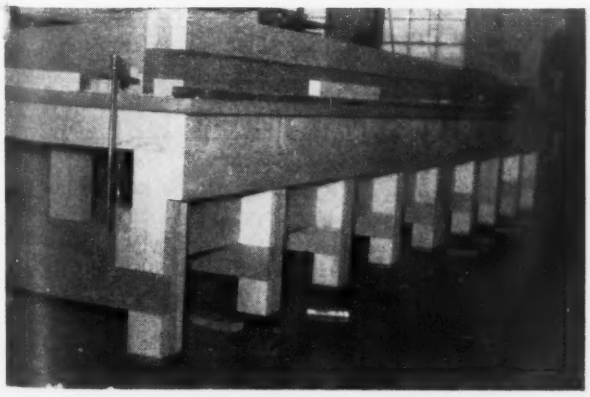


One of the four sections required for this job.



Airfoil template shown on one of the cradle sections.

Rigid table construction with jack-screw underplate for every leg.



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Adventures of Bill

By PAT DWYER

Illustration by RICHEY

"AS A MAN in touch with current events," Bill said to me the other night, "have you any theory to account for the epidemic of debating clubs that has broken out recently like a rash over the educational face of the country? Every paper you pick up carries an item about two opposing teams locked in a deadly struggle over the relative merits of town and country life, marriage or single blessedness, the mountains or the seashore, blondes or brunets, or some equally insoluble problem that would not amount to tuppence ha'penny, even if it was settled."

"I should not like to get tangled up in a debate with you," I said. "You are too careless in the choice of words and you calmly present assumptions that have no basis in fact. For example, what authority have you for stating 'Every paper you pick up etc.?' 'Tis true I read a few papers now and again, some through choice and others through necessity, but I have noticed no reference to this debating plague which you claim has the country in an iron grip."

"For a lad who has not been reading the papers, a blinkin' blighter who wilfully misconstrues my plain statement, you seem to have a fairly full grip on the essential features. However, what I started out to say, or rather what I was leading up to, was that it is a wonder that some of these clubs do not select an original subject. Cut out these useless and long-winded battles in which the wordy warriors hurl pinched extracts from the encyclopedia at each other. Give 'em a good juicy subject into which to sink their teeth—"

"Ah! I see. Fling tomatoes, grapefruit and what not at each other, eh? Fine! I get the idea."

"I'd like to dot you one with a good ripe tamata right now!"

"Steady all! Stand by to go about. Perhaps—although it seems too much to expect—perhaps you have a subject in mind. One that is not hackneyed. A subject that is—as you put it so neatly—good and juicy, into which the old fangs may be driven with a certain amount of vim and vigor."

"And how," Bill remarked complacently. "I would have two hand-picked teams debate violently: 'Resolved that the farmer can present a better alibi than the molder for a defective product.'"

"At one time or another I have heard fearful, wonderful and ingenious excuses offered for defective castings, but even the most brilliant mind cannot compete with the forces of nature. In a debate of the kind you have in mind, the farmer has all the cards stacked in advance. In addition to the hazards incident to the presence of the human factor, he is aided and abetted by all the natural and supernatural forces. He can blame hail, rain, snow, early frosts, cut-worms, jiggers, corn borers, caterpillars, grasshoppers, boll weevils, lightning, sour soil, lack of googum in the fertilizer, and at least 47 other factors over which he has no control.

"Of course, as I said before, the molder is an exceedingly ingenious individual in oozing out of a slippery corner, but in adopting the negative in 'Resolved that the farmer can present a better alibi than the foundryman for a defective product' he would have no more chance of winning a decision that a rabbit would have in playing hop-scotch with a kangaroo."

"Well," Bill said, "I'll tell you. Although you show some of the wild kangaroo strain in jumping to conclusions, I hardly can blame you in the present instance. As a party of the first and also as a party of the second part I have heard and presented many excuses for defective castings. Based merely on personal experience my views would coincide with yours on the utter futility of comparing the molder's excuses with those of his agrarian brother. However, through the kindness of an old Jersey City friend I now have a list of excuses for bad castings that will mow down these farmer lads as

(*Continued on page* 210)

The dog chased the cat that caught the rat that ate the cores in the mold

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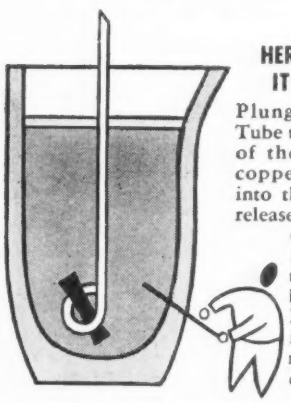

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(*Continued from page* 208)

grain falls before the reaper or, as the late Bro. Byron puts it so neatly in the *Siege of Corinth:* 'Even as they fell in files they lay, like the mower's swath at the close of day.' Just throw your eye, well, both eyes if you like, over this noble list."

WHAT EVERY MOLDER KNOWS

Dull metal
Bum facing
Dirty metal
Rotten sand
Chaplet blew
Core blew up
Metal too hot
Shop too dark
Shop too light
Metal too hard
Cores too hard
No vent in cores
Flask burned out
Plumbago no good
Blue Monday jinks
Loose bars in cope
Pattern was warped
Boss didn't tell me
Metal came too late
Metal came too soon
Rat went down riser
Laborer fell over mold
Dog walked across mold
Pattern was made wrong
Metal ran down rat hole
Too much flour in cores
Not enough googum in sand
Wind blew dirt down riser
Laborer knocked off clamp
Swab pot fell over on mold
Cockeye cat ran over mold
Laborer couldn't talk English
Boy didn't skim metal enough
Boss didn't tell me to cut gate
Boss didn't give me enough metal

'The fiendishly ingenious feature of these excuses is that they carry just enough truth to make them plausible. Only a boss on the job at the particular time one of the excuses is presented can determine whether it is acceptable or not. Undoubtedly, rotten sand or bum facing may be responsible for a defective casting. The same is true of dull metal, dirty metal, metal that is too hot, or a burned-out flask. However, in each of these cases and in front of a competent examiner the excuse maker is faced with a second question, viz.: With all this foreknowledge why did he not either refuse to use the materials, or file a formal protest before using them?

"Some of the excuses certainly lie outside the molder's scope of influence. Manifestly a man cannot stand guard night and day to prevent stray dogs from running over the molds, or rats from playing hide and seek up and down the risers. He has no command over the breezes that blow in through open doors and broken windows and carry a stream of loose sand down the gates. Laborers have been known to knock clamps from molds, also fall over them, and they hardly can be expected to learn English the day after they land in the country. Cross-eye cats, blowing chaplets and swab pots that cannot stand upright constitute afflictions almost as hard to bear as shops that

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are too dark or shops that are too light, or metal that comes too soon or too late. When all else fails the molder can fall back on the old reliable standard, 'Well, the boss did not tell me.'

"Speaking about farmers, telling people things, and one thing and another remind me of an inquiry I had from a man interested in the manufacture of plows. He wanted information on the best and latest methods for molding and casting mold boards for plows. How is the carbon deposit removed from the face of the chill, and how is the face resurfaced to give the chill renewed life? What is a suitable mixture for a 3000-lb charge in the cupola?

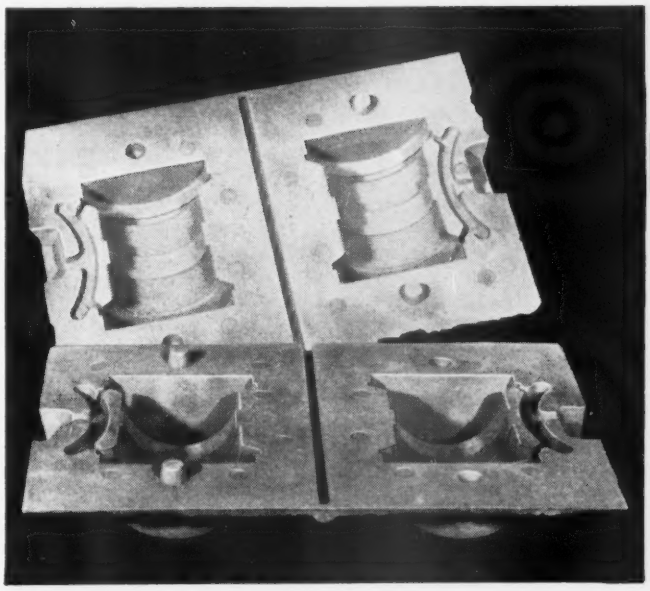
"If this inquirer knew nothing at all of the subject, his question would entail a long and elaborate answer covering many related features. From his reference to chills and carbon deposits it is apparent he is familiar in a general way with the production of these castings. This simplifies the answer and, incidentally, reminds me of the simile used by big Basil Laeunesse, the ci-devant blacksmith in Longfellow's *Evangeline*. Extolling the many advantages of his Louisiana ranch over the Acadian homeland from which he and his compatriots had been evicted in a heartless and shameful manner he said: 'Sweetly the plowshare runs through the soil as a keel through the water!' Can you imagine anything sweeter than the sight and smell of the fresh turned earth flowing smoothly from the curving side of a shining mold board?"

"Well," I admitted, "the rumor has drifted into the old bailiwick—you know how rumors drift—that a certain measure of pleasure may be derived from listening to a person who sticks to one subject. However—"

"The old straight and narrow, hey? I'd hate to have a one-track mind like that of some of the unfortunate creatures in the immediate vicinity. Since your creaking, rusty old mental apparatus will not permit you to follow me in an occasional little flight of fancy I shall confine my further remarks strictly to the subject and, as far as possible, cut the words down to one syllable.

"Mold board castings which must be both hard and tough to stand up under severe service conditions are poured from a low-silicon iron mixture in which many foundrymen favor 10 per cent charcoal iron. The cupola charge can be made in many ways depending on the available material to conform to the following ap-

MORE PROOF of complete success in SHELL MOLDING

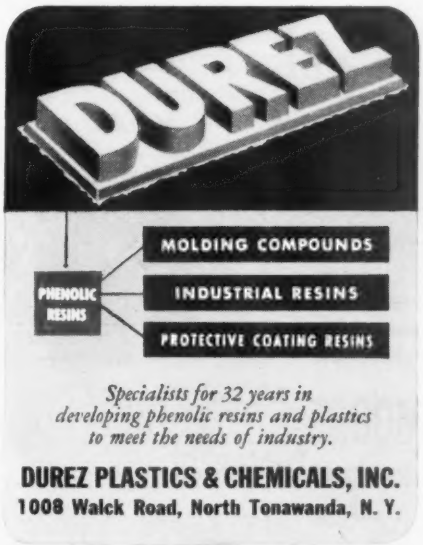


...with DUREZ resins made by Phenolics Specialists

A growing number of industries are turning to shell mold castings in ferrous and non-ferrous metal alike, where excellent surface finish and good dimensional accuracy are required.

In this nickel silver floor drain, shell molds made with Durez resins eliminated five machining operations. Threads are sufficiently accurate to require no cutting or chaser die operations. The parts mate with no scrap loss from thread misfit. Metal is saved through elimination of bars inside of castings as well as metal removal in machining. The hollow core illustrated is made with a standard shell mold mix of Durez resin and sand.

The basic advantages of shell moldings are being obtained in mechanized operations on high production runs as well as on comparatively short-run jobs, using resins especially developed by Durez for this process. As phenolics specialists for 32 years, we also offer you a wetting agent that minimizes dust and segregation. For economical production of green sand cores investigate our new phenolic type binder.



Specialists for 32 years in developing phenolic resins and plastics to meet the needs of industry.

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1008 Walck Road, North Tonawanda, N. Y.

WHY NOT MAKE USE of our success in working with foundrymen when you adapt the shell mold process to your requirements? Our engineering staff has the answer to many questions and will gladly work with you toward achieving the results you want.

This coupon gets things started

DUREZ PLASTICS & CHEMICALS, INC.
1008 Walck Road, North Tonawanda, N. Y.

Send me information on the shell molding process.

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PHENOLIC RESINS THAT FIT THE JOB

MORE PRODUCTION from each PRODUCTION DOLLAR

An immediate way to realize more production per manhour—and at minimum investment—is by the installation of CM Electric Hoists. By making use of non-productive overhead space you can speed the flow of parts and assemblies... raise employee efficiency levels... reduce fatigue. As anyone can operate these CM Electric Hoists, skilled manpower is released for other production operations. Valuable floor space is made free for added production. Here are two CM electric hoists favored particularly by plant production executives.

CM METEOR Capacities: ½ to 5 tons

Low headroom wire rope electric hoist for heavy duty service. Single and two speed models. Push button control. High efficiency airplane type cooling. Helical gears. Fully enclosed operating parts. Precision bearings at all rotating points. Plain, geared or motor driven trolleys.

CM COMET Capacities: ⅛ to 2 tons

Portable, compact and rugged electric chain hoist. Available in push button and pendant rope control models. Equipped with flexible HERC-ALLOY load chain. Fully enclosed working parts. Upper and lower safety limits. Permanently lubricated. Plug in on 110, 220 or 440 volt power line. Used extensively in production operations.

● **CM Electric Hoist Catalog** sent on request with prices and name of your local CM distributor. Production executives find our catalog a good source of hoist information.

CM HOISTS AND CHAIN

CHISHOLM-MOORE HOIST DIVISION
COLUMBUS McKINNON CHAIN CORPORATION
TONAWANDA, NEW YORK
DISTRICT OFFICES: NEW YORK, CHICAGO, CLEVELAND

proximate analysis: Si 1.00 per cent; S under 0.10 per cent; P 0.30 per cent; Mn over 0.80 per cent. A typical mixture for a 3000-lb charge might contain 10 per cent steel scrap, 300 lb; 10 per cent low silicon charcoal iron, 300 lb; 40 per cent No. 2 foundry pig iron, 1200 lb; 40 per cent shop scrap, 1200 lb.

"The mold is made flat on the floor in the usual manner and then turned up on edge to receive the molten metal. The drag part of the mold is an iron plate on which one side conforms to the shape of the mold board pattern or casting, while the other or lower side is hollowed out roughly to give a uniform thickness, approximately 1½ in. The gate is formed permanently in the drag, but the sprue and runner are formed in the sand cope in such a manner that the iron enters the casting at the lower edge when the mold is in pouring position.

"The face of the chill or drag is provided with prints for the bolt cores, and in addition is scored all over with a number of light lines about 2 in. apart at right angles to each other. The purpose of these lines is to hold the iron as it commences to congeal, close to the face of the drag and thus prevent the formation of hollow spaces on the face of the casting. Impressions left by the lines are ground off afterward in the finishing department. Immediately after the castings are poured, they are shaken out and buried in hot sand in brick-lined pits where they remain for approximately 36 hours.

"If by removing the carbon from the face of the chill, reference is made to carbon deposit from the oil, the answer is that a smaller quantity of a thinner oil should be employed. Only a thin film is required to prevent adhesion of any moisture. This thin film is volatilized by contact with the molten iron. However, under certain conditions a thin carbon deposit may be built up. The best way to remove this deposit is by blasting.

"Grinding, or other tools should not be applied to the iron face of the mold. They destroy the skin. The metal underneath deteriorates rapidly in service. The molds are used continuously until they warp or crack. Then they are thrown back into the cupola and remelted as part of the charge. Since the surface has been burned or oxidized to some extent in the course of a fairly long life, the iron cannot be rated as first-class scrap."

Once is not enough!

The need for blood is greater than ever, not only for men wounded in combat, but here at home . . . to cure disease, to meet accidents and disasters, and to prepare for civil defense.

Our quota can ONLY be met, if those who give *keep on* giving . . . regularly!

You CAN give more than once . . . as often as every three months with complete personal safety. The more often you give the more often you save a life. For every pint of blood you give goes to someone who needs it desperately.

Remember . . . once is NOT enough. Give blood again and again! Call your Red Cross, Armed Forces or Community Blood Donor Center for an appointment to give blood today.

GIVE BLOOD

...give it again and again

BUSINESS EXECUTIVES!

CHECK THESE QUESTIONS

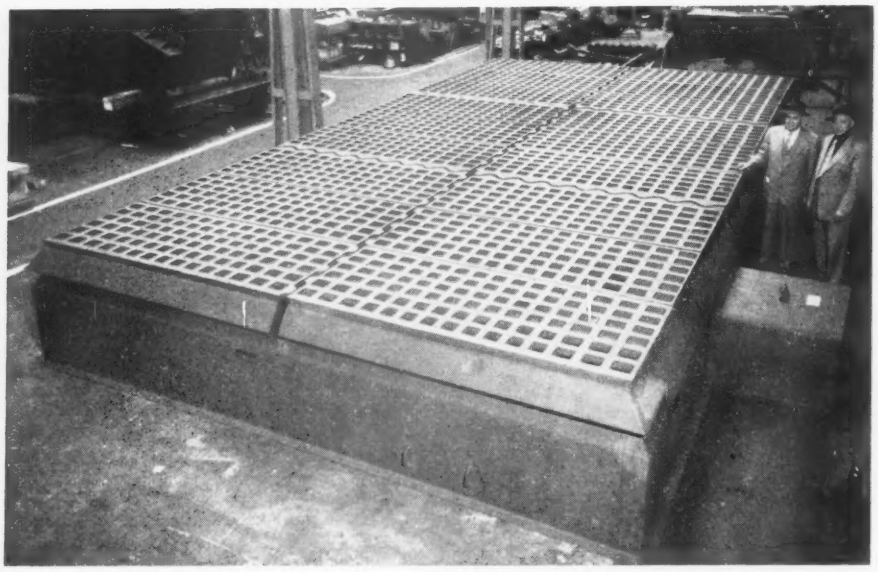
If you can answer "yes" to most of them, you—and your company—are doing a needed job for the National Blood Program.

- ◯ HAVE YOU GIVEN YOUR EMPLOYEES TIME OFF TO MAKE BLOOD DONATIONS?
- ◯ HAS YOUR COMPANY GIVEN ANY RECOGNITION TO DONORS?
- ◯ DO YOU HAVE A BLOOD DONOR HONOR ROLL IN YOUR COMPANY?
- ◯ HAVE YOU ARRANGED TO HAVE A BLOOD-MOBILE MAKE REGULAR VISITS?
- ◯ HAS YOUR MANAGEMENT ENDORSED THE LOCAL BLOOD DONOR PROGRAM?
- ◯ HAVE YOU INFORMED EMPLOYEES OF YOUR COMPANY'S PLAN OF CO-OPERATION?
- ◯ WAS THIS INFORMATION GIVEN THROUGH PLAN BULLETIN OR HOUSE MAGAZINE?
- ◯ HAVE YOU CONDUCTED A DONOR PLEDGE CAMPAIGN IN YOUR COMPANY?
- ◯ HAVE YOU SET UP A LIST OF VOLUNTEERS SO THAT EFFICIENT PLANS CAN BE MADE FOR SCHEDULING DONORS?

Remember, as long as a **single** pint of blood may mean the difference between life and death for **any** American . . . the need for blood is **urgent!**

NATIONAL BLOOD PROGRAM

New EQUIPMENT an



Shakeouts: Allis-Chalmers Mfg. Co., Milwaukee 1—Design improvements in the company's line of shakeouts include simplified two-bearing construction, cushioned vibratory action and a specially designed pivoted motor base which helps to maintain proper V-belt tension. Equipped with one dust seal instead of the two to five on older models, the bearings are evenly loaded, and shaft stresses are low. One bearing is of the straight shaft floating type, to allow for changes in shaft length caused by temperature variations. Steel coil springs supporting the shakeout body, mechanism and deck have a low maximum stress and sufficient deflection to provide over 92 per cent absorption of vibration. As the load on the shakeout compresses the springs, the pivoted motor base automatically adjusts the center distance to maintain proper V-belt tension on the drive. Shakeouts are built as single units in capacities ranging from 2000 to 50,000 lb. The single units can be combined into multiunit arrangements for higher capacities, such as the 16 x 30-ft, 300,000-lb capacity shakeout shown here. It is made up of six 50,000-lb units.

For More Details Circle No. 1—Page 217

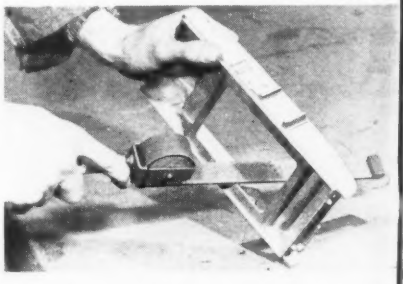
Hand Cleaner: E. I. Dupont de Nemours Co., Wilmington, Del.—Liquefying, waterless hand cleaner which is said to remove dirt, grease, paints, oils, carbon, tar, shellac and other soiling agents requires only one or two teaspoonfuls per washing. It turns from a cold cream consistency to a liquid in a few seconds of contact with skin. Cleaning is by solvent action; the liquid rapidly reaches crevices of the skin and dissolves grease and grime. The composition contains lanolin for its value as a skin softener. After cleaner has been applied and rubbed in, it is wiped off with a cloth or paper towel. Water may be used, but is not necessary.

For More Details Circle No. 2—Page 217

Industrial Truck: Automatic Transportation Co., 149 West 87th St., Chicago 20—Gas-powered industrial truck with electric transmission reportedly combines low maintenance costs, performance characteristics and long life of straight electric trucks with the constant power source derivable from gasoline engines. Infinite step transmission has no mechanical connections from engine to drive unit, eliminates transmission gears and hydraulic torque converters or overdrive mechanisms and cuts out shock loads to engine. Truck offers increased vision from driver's seat, full-sized bench-type seat, extra leg room, centralized controls and grouping of all instruments on the steering post column. Hydraulic service brakes are interlocked with emergency disk brakes so that both are operated by the same pedal. Optional equipment includes water and catalytic mufflers. Capacities range from 4000 to 6000 lb. Height of telescoping lift is 124 in., with a standard 83-in. over-all height for either monolift or duolift models. Monolift model has a free lift of 24 in.

For More Details Circle No. 3—Page 217

Abrasive File: Monarch Machine Shop Inc., Madison, Wis.—Abrasive file is used like a conventional metal file, but the cutting surface feeds from a coated abrasive roll. Designed for deburring and other filing and finishing operations in metalwork-



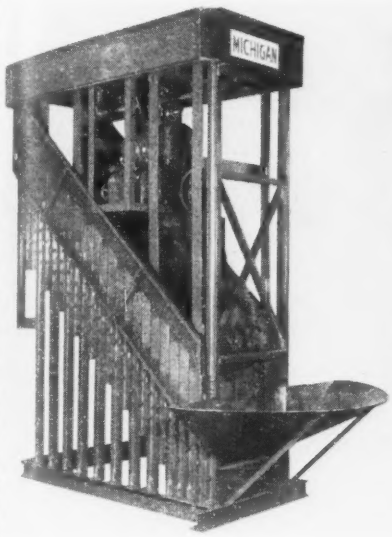
ing, it features an 11-in. stroke. The file holds a roll of more than 6 ft of abrasive cloth that is dispensed as needed to provide a fresh surface and to maintain peak cutting efficiency. When the tool becomes dull, only the cutting surface needs to be replaced. The file comes in 1-in. and 1½-in. width, with a Minnesota Mining & Mfg. Co. grit 80 abrasive roll. Minnesota Mining & Mfg. abrasive cloth utility rolls in 50-yd lengths are available for refill purposes in grit sizes ranging from grit 24 to 320.

For More Details Circle No. 4—Page 217

Furnace Loader: Michigan Crane & Conveyor Co., 115 Mc Kinstry St., Detroit 9—Heat treatment furnace loader automatically

UPPLIES

For More Details on these Items Use Reply Card—Page 217



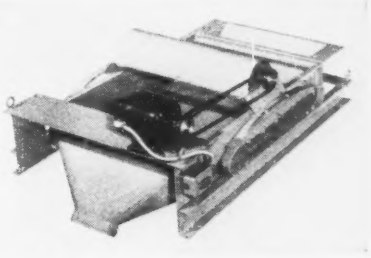
removes material from a hopper and discharges it in even and metered quantities into an endless belt type of heat treatment furnace. A series of synchronized, vertical - moving pushers cut on a 30-degree angle remove parts from the hopper, raising them to the next level and causing them to roll off by gravity. Material is elevated and transferred in this way through a series of cycles until it is discharged into the furnace. It is claimed that one man can load from 500 to 4000 lb per hour of small castings to the full capacity of the furnace for an indefinite run. Loader is 8 ft long and 10 ft high. It is made of steel parts, complete with drive, variable speed controls, overload safety clutch, reversing starters and pushbutton controls.

For More Details Circle No. 5—Page 217

Powdered Metal Coatings: Linde Air Products Co., Division of Union Carbide and Carbon Corp., 30 East 42nd St., New York 17—Method of applying hard, thin, precise coatings of powdered metals such as tungsten carbide on metal parts is said to help solve frictional and abrasive wear problems. Company asserts that tests indicate that tungsten carbide coatings applied by this method have the desirable properties of sintered tungsten carbide, yet avoid some of its limitations. Temperature of base metal does not exceed 400°F during the plating operations. Bond between base metal and coating is mechanical, not welded. Steels, cast iron, aluminum, copper, brass, bronze, titanium and magnesium in many shapes have been coated successfully by this method, according to the company. Coatings from 0.0005 to 0.02 in. thick have been applied. All commercial coating by this method is done at the company's Speedway Laboratories in Indianapolis.

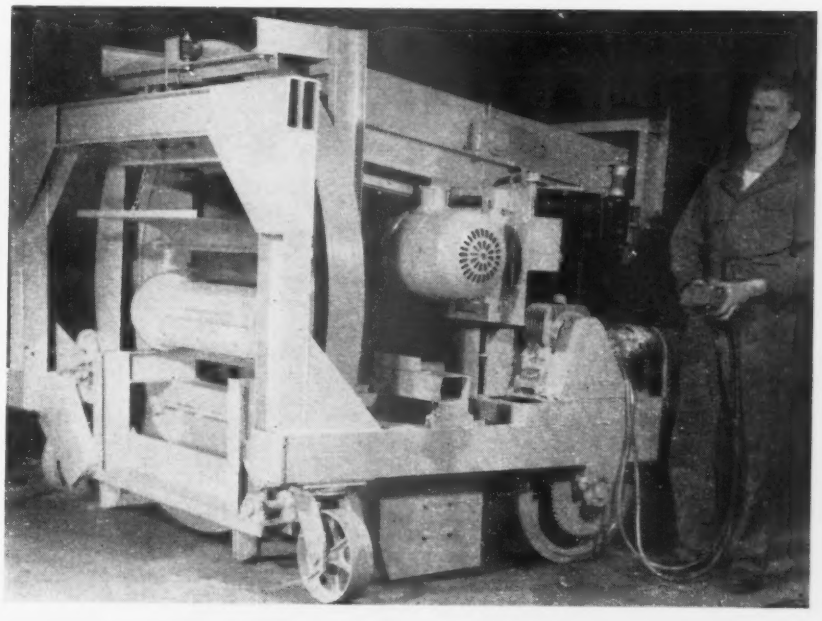
For More Details Circle No. 6—Page 217

Vibrating Screens: Universal Vibrating Screen Co., Racine, Wis.—High-speed vibrating screen, 24 x 36 in., can be either aerially suspended or floor mounted with equal operating efficiency. A portable stand with pitch adjustment also is available optionally. Mesh panels are mounted in hook strips and can be installed or removed quickly by releasing tension wing nuts at the side of the frame and sliding the panels



Sand Conditioner: States Engineering Corp., 922 West Berry St., Fort Wayne 6, Ind.—Self- propelled, self-loading sand conditioner is especially designed for applications where shakeout sand has very high dry strength, where starting space is limited or where high screening capacity is needed in a compact machine. Model shown has a 3 x 6-ft gyratory screen and an over-all length of 84-in. It picks up a swath of 78 in. and needs 22 in. of starting space between the wall and the shakeout. Machine features a 36-in. permanent magnetic pulley, centrifugal lifting elevator, 36-in. high-speed aerator and a built in watering device. Capacity ranges up to more than a ton per minute. Over-all height in working position is 6 ft, 6 in.; in raised position (done hydraulically) for 30-in. straddling clearance, it is 8 ft, 8 in. Smaller model has a 2 x 6-ft screen, 24-in. magnetic pulley and 24-in. aerator. It picks up a 68-in. swath. Both models may be equipped with a windrowing belt which eliminates the need for prior windrowing and permits prepared sand to be discharged in windrows.

For More Details Circle No. 7—Page 217



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Because Electro serves best at job-side, this procedure ought to serve your grinding wheel needs best too.

Whatever you desire to improve or accomplish . . . with any grinding or cutting-off operation . . . why not accept this suggestion: put your problem up to Electro at your job-side?

Under your actual working conditions Electro will demonstrate, with a wheel or wheels, for your specific-purpose, just what can be expected from a combination of what you know about your problem and what we can contribute in the way of improving or accomplishing what you desire.

Write, wire or phone us to send one of our technical experts to your plant for consultation, at no cost or obligation to you . . . and no sales pressure. Electro Refractories & Abrasives Corp. 344 Delaware Avenue, Buffalo 2, N. Y.

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Specific Purpose

Electro TRADE-MARK SINCE 1919

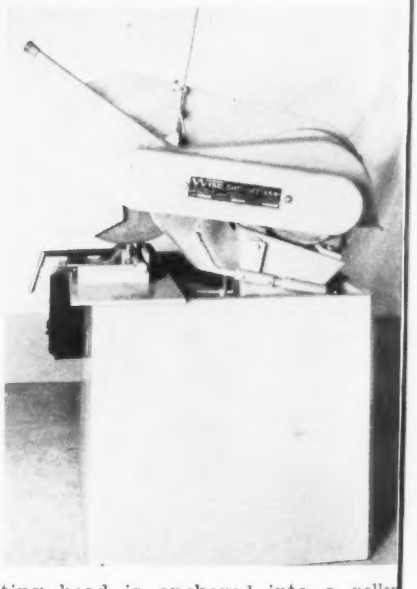
K-437

Resinoid and Vitrified GRINDING WHEELS

out from either end. The unit operates quietly at 1800 rpm without escape of vibration to supporting members. Standard models are equipped with 1/3-hp 1-60-110 open type motor and drive, but other types of motors are available, including gas engine drive for special applications. Attachments are available for dust-tight enclosures.

For More Details Circle No. 8—Page 217

Cutoff Saw: Henry H. Wise Co., 945 Wilshire Blvd., Los Angeles 17—Abrasive cutoff saws use 7½ or 10-hp heavy-duty, constant torque motors and 18 or 20-in. wheels and reportedly cut through 6-in. pipe or 8-in. channel in 6 seconds. A nylon reinforced wheel is used for cutting off gates and risers. Swivel acton of cut-

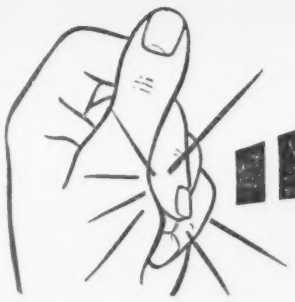


ting head is anchored into a roller bearing support so that head operates without play. All positions are calibrated. Heavy-duty counterbalancing spring absorbs 90 per cent of all weight and reduces operator fatigue. Power is transmitted to the abrasive wheel through five, heavy-duty V-belts. Machine is equipped with safety guard that also acts as spark arrester. Cutting head is cast aluminum. Both right angle or swing head models are available with either 7½ or 10 hp motors. Same manufacturer produces abrasive cutoff wheels.

For More Details Circle No. 9—Page 217

Bin Level Indicators: Bin-Dicator Co., 107-13946 Kercheval Ave., Detroit 15—Improvements to all models of the company's bin level indicators consist of modified frame design which permits easier access to operating mechanism and wiring connections, better and simpler switch installation and greater flexibility in wiring and conduit installations. Units equipped with mer-

(*Continued on page* 219)



IDEAS FOR FOUNDRYMEN

AVAILABLE FOR THE ASKING—This reader-service is designed to provide foundrymen with "idea" and reference material. Listings are selected from company product literature and reprints of special FOUNDRY editorial articles.

51. Electric Motors

The Louis Allis Co.—No matter what your motor requirements are, you should find what you're looking for in 22-page motor application catalog 200. It provides composite information and selection charts for all types of motors, illustrates typical applications of various types and supplies data on mechanical and electrical construction of L-A motors.

52. Band Saws

Moak Machine & Tool Co.—High speed band saws are the subject of 10-page catalog. Features include equalized two-wheel brakes and lubricated-for-life paddock guides. Motors are 3, 5, or 7½ hp.

53. Power & Free Conveyors

Jervis B. Webb Co.—You'll not let any cobwebs gather on your copy of this 80-page illustrated catalog No. 52 on power and free conveyors once you see the benefits that can be derived from its use in your foundry. It describes component parts, has many dimensional drawings and all the engineering details you might want.

54. Dust Collectors

Peters-Dalton Inc.—16-page illustrated technical bulletin 101 has the dope on Hydro Whirl dust collectors, including an outline of the principle of operation, various rotor, pump orifice and special types available and advantages offered. Diagrams for various types are included, along with a simplified method of planning your Hydro Whirl System.

55. Colloidal Graphite

Acheson Colloids Corp. — Here, friends, is a set of two 6-page illustrated bulletins, 425 and 427, that relate the place of "dag" colloidal graphite in the foundry and its use as a parting agent. Former covers use for chills, permanent mold coatings, lubrication, etc.

56. Rocking Furnaces

Detroit Electric Furnace Div., Kuhlman Electric Co.—Four models of rocking electric furnaces are featured in 4-page bulletin 504, having molten metal capacities from 750 to 8000 lb per heat. Units are of the hydraulically controlled pedestal mounted type.

57. Plastic Coating

Fidelity Chemical Products Corp.—If you're looking for a hot melt plastic coating for protection of a wide variety of parts during storage and/or shipment, get this 4-page bulletin on Dip-Pak. It outlines three coatings, gives the characteristics of each and gives uses.

58. Pneumatic Conveyor

Crane Co.—Turbo-Drive is a pneumatic pipe line conveying system for transporting sand or other bulk materials. It is described and illustrated in 4-page bulletin AD-1906. Advantages, capacities and typical applications are covered.

59. Hydraulic Cylinders

Lindberg Engineering Co., Air & Hydraulic Div.—Eight different types of mountings are available for Lindberg hydraulic cylinders, available in capacities up to 3000 psi and described in illustrated bulletin 701. Complete specs are given for every model—and there are lots of them!

60. Grinding Wheels

Cleveland Quarries Co., Sterling Grinding Wheel Div.—Lower costs, increased production and time savings are realized from use of Easy-mounts and grinding wheels described and illustrated in 4-page folder. Mount is purchased only once and holds bonded wheels for carbide and steel tool grinding.

Additional Information?

For additional information on any of the items described under "New Equipment and Supplies," "Trade Publications" or "Helpful Literature" in this issue—simply circle corresponding item numbers on one of these cards

8-53

FOUNDRY
Penton Building, Cleveland 13, Ohio

Please send literature or detailed information on subjects circled at left to—

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61. Foundry Equipment

Simplicity Engineering Co.—18-page bulletin F-6 tells of shakeout screens, sand screens, lump crushers and feeders and conveyors. The gyrations don't run as hot as a hula, but they get results just the same.

62. Foundry Nails

Angell Nail & Chaplet Co.—Your foundry wall is the place for this chart of foundry nails. Printed on heavy stock with excellent visibility, it covers standard head, core and super head foundry nails and presents the features of each in actual size.

63. Aluminum Alloy Flux

Apex Smelting Co.—Read all about how Apex aluminum flux can be used to produce a homogeneous, sound metal in this 8-page illustrated bulletin. Typical examples of improvement in mechanical properties by its use are shown in statistic, photo and photomicrograph. Prices, too.

64. Goggles, Helmets, Masks

Chicago Eye Shield Co.—How to use and select industrial safety equipment is the subject of 64-page bulletin. Shows a complete selection of protective lenses, goggles, helmets and masks, also includes such items as acid-resistant clothing and respirators.

65. Melting Furnaces

Stroman Furnace & Engineering Co.—20-page catalog No. 800 gives examples of a line of metal melting furnaces and foundry equipment including aluminum and magnesium and crucible furnaces, core ovens, oil burners and blowers. Pretty hot stuff, this.

66. Concrete Silos

Marietta Concrete Corp.—Industrial concrete silos and storage systems are described in catalog 35-L-1. Capacities of the silos range from 4520 to 35,300 cu ft. Construction drawings are given, showing styles, discharge arrangements, etc.

67. Blast Cleaning

Pangborn Corp. — Hand-operated nozzle blast cleaning equipment is described in 28-page bulletin 100A. Nine machines are discussed in detail, and selection of the proper type for a given application is thoroughly gone into.

68. Sand Reclamation

National Engineering Co. — Reclaiming foundry sand at rates between 1 and 6 tons per hour, the standard scrubber described in 8-page bulletin 512 will produce sand of sufficiently high quality for use in cores. Operating principles, installation arrangements and features are fully described.

69. Materials Handling

Palmer-Shile Co. — Racks, trucks, pallets, carts, and grabs of many types are just a few of the items from the exhaustive company line described in new 40-page bulletin. Specs and photos given for each product.

70. Gun Mix

Cargan Products Co.—We'd like to shoot off our mouth about Cargan gun mix cupola lining, but available 6-page folder can do it better. Better send for it.

71. Ingot Mold Washes

United States Graphite Co.—Caramba, senor, bulletin 15 is not so full of bull. It gives you nine good reasons why Mexican ingot mold washes will bring you more pesos. Ees no time for siesta, Senor. Ees time to send for bulletin 15 pronto and know the reasons why.

IMPORTANT READING FOR FOUNDRYMEN
We have a limited quantity of the following reprints which we can furnish while they last.

72. Plastic Core Driers

"Reinforced Plastic Core Driers" developed for electronic baking are subject of FOUNDRY reprint of the same title by F. A. Vainosky, American Cyanamid Co. Technique used by company to produce driers and boxes is described.

73. Investment Foundry

What's the story on investment casting? Ted Operhall, vice president of Misco Precision Casting Co., effectively describes the process in illustrated FOUNDRY reprint "New Precision Investment Foundry." Foundry's specialized equipment is highlighted along with such phases of the operation as wax injection and assembly, dipcoating, flask lining, investment preparation, investing, dewaxing, casting, shakeout, cleaning and finishing.

74. Flask Selection

"How to Select and Maintain Flasks" is told in informative FOUNDRY reprint of the same title. Factors considered in the article include proper amount of sand, size of the cope and drag, strength and design of the flask, types of pins to use, and utilization of clamps.

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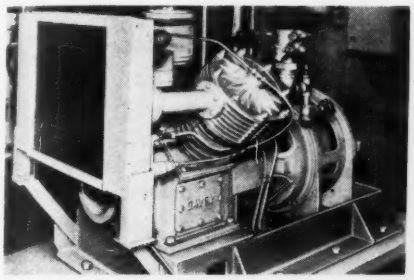
(*Continued from page* 216)

cury switch, general purpose micro switch and explosionproof micro switch also have new diaphragm back plates which increase sensitivity and limit diaphragm travel to the minimum necessary for switch actuation. Units have only three moving parts, employ no motors or springs and need no lubrication.

For More Details Circle No. 10—Page 217

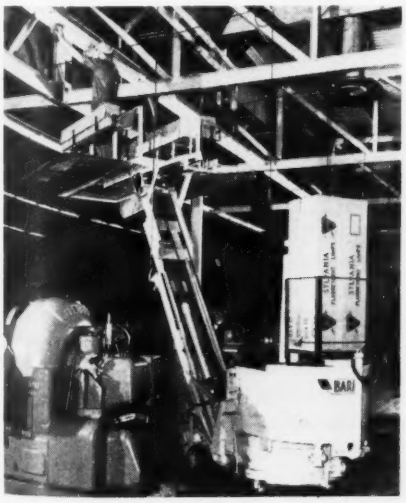
Air Compressor: Davey Compressor Co., Kent, O.—Stationary air compressor for general industrial applications has a displacement of 128



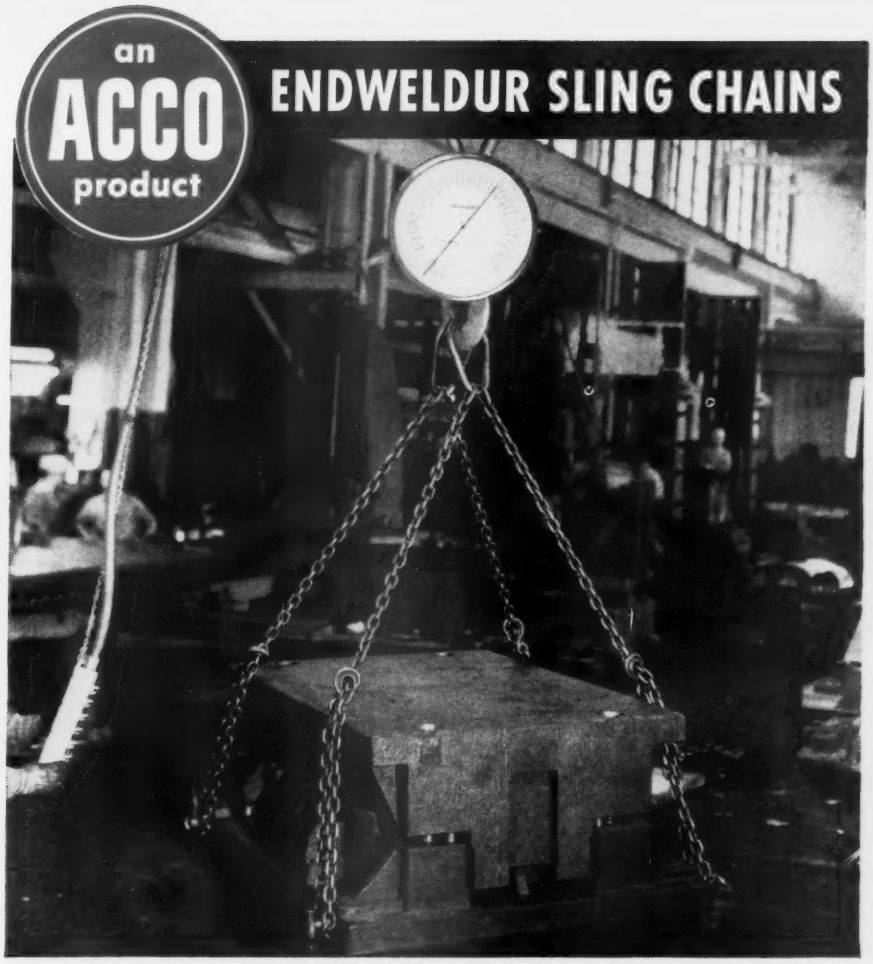
cfm, is directly connected to a 25-hp electric motor and is available with constant speed or start-and-stop pushbutton controls. It is of V-type design, with one 7⅜-in. low pressure cylinder and a 4⅜-in. high pressure cylinder. Stroke is 4½ in. Unit is furnished complete, ready for mounting on sub-base. Standard equipment includes intercooler with safety valve, air cleaners, air pressure regulator and unloaders, motor starter and controls. It is 38 x 38 x 62 in. and weighs 1635 lb.

For More Details Circle No. 11—Page 217

Maintenance Lift: Barrett-Cravens Co., 4609 South Western Blvd., Chicago—Battery-powered lift unit



enables one man to do maintenance jobs which require him to reach as much as 19 ft high. He rides the unit to the job, pushes a button and is up in the air, ready to work, without



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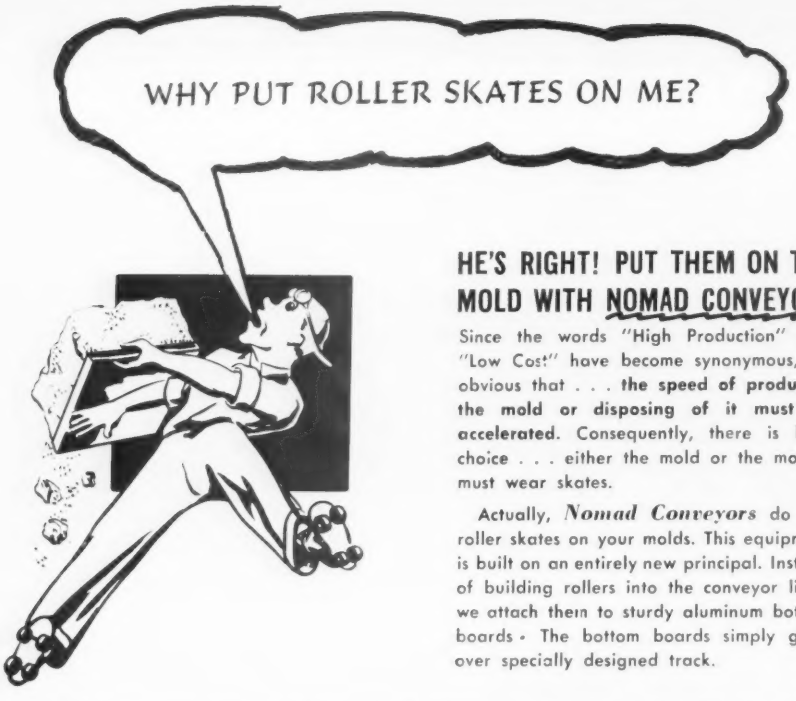

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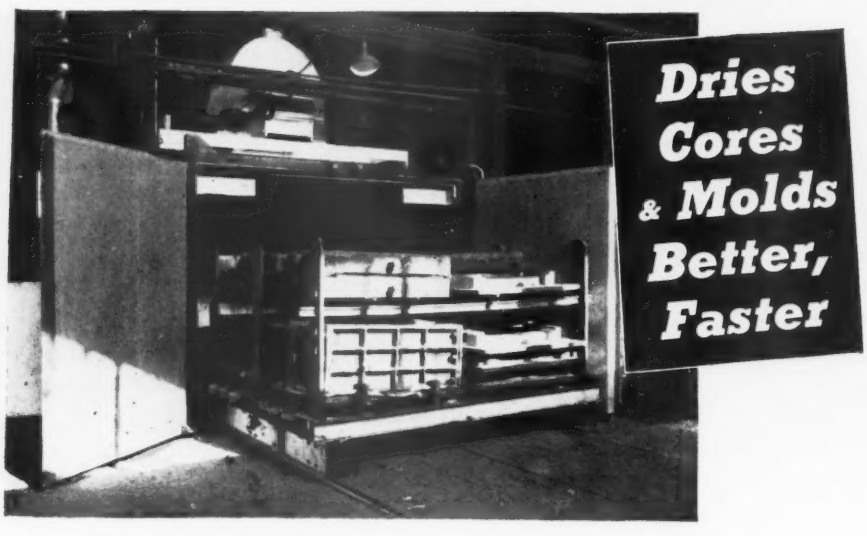

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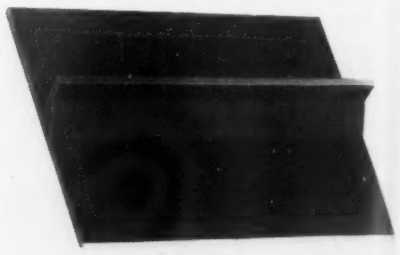
moving ladders or carrying tools and equipment. Platform rises to 12 ft, 8 in. above the floor.

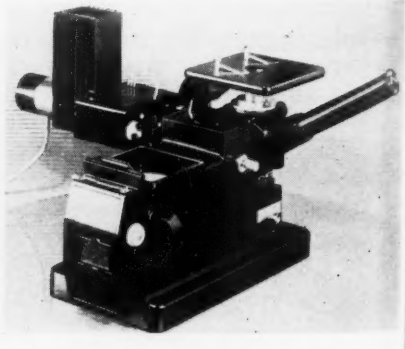
For More Details Circle No. 12—Page 217

Conveyor Belting: Goodall Rubber Co., Whitehead Rd., Trenton 4, N. J.—Rubber conveyor belting is made with rubber cleats incorporated as integral parts of the belt itself. It is said to resist breakage or pulling off of the cleats and to minimize damage to products being conveyed. The cleats themselves can be built on any grade of belting ordered.



For More Details Circle No. 13—Page 217

Microscope: Oppelm Co., 352 Fourth Ave., New York 10— Metallurgical microscope and metallograph is designed to occupy a minimum of space. All operations are confined to an area of 8 x 8 x 13 in. Unit provides visual observations at magnifications up to 1000X and projection observation up to 1500 X. Group observation of specimens is permitted by projecting the light beam through the camera housing onto a screen. A 2½ x 3½ reflex camera that uses both plates and roll film is supplied. Device is provided with two dry objectives for low and medium magnifications and one oil immersion objective for high magnifications. Seven interchangeable photographic lenses are supplied to cover the full range of magnifications up to 1500X.



For More Details Circle No. 14—Page 217

Protective Lenses: Eastern Equipment Inc., Willow Grove, Pa.—Types of lenses available for use in welders' goggles, helmets and hand shields include green lenses that eliminate glare in aluminum welding; co-

balt blue lenses for smelting and furnace work; nonpit cover lenses that are spatter resistant and can be used under extremely moist conditions; shatterproof laminated lenses and other types. Lenses are made to meet or exceed federal and Navy specifications.

For More Details Circle No. 15—Page 217

Carbon Rods: Stackpole Carbon Co., St. Marys, Pa.—High-purity spectrographite rod for critical chemical and metallurgical analysis by the spectrographic process is said to contain less than 0.001 per cent impurities. It is supplied in lengths up to 12 in. long and in diameters of ⅛, 3/16, ¼ and 5/16 in.

For More Details Circle No. 16—Page 217

Stock Carrier: Rack Engineering Co., Connellsville, Pa.—Heavy-duty tubular stock carriers with wire

mesh sides can be moved as single units or as a trackless train. They can be stacked up to six high with a standard fork truck. Corner posts are made of seamless tubing, and corrugated ends and base provide double strength where shock and wear are greatest. For easy access to contents, sides drop down on heavy-duty hinges. Two swivel type and two rigid 6-in. roller bearing steel casters provide good mobility. Units may be ordered from stock or in any special size or capacity.

For More Details Circle No. 17—Page 217

Rubber Hose: Hewitt - Robbins Inc., 666 Glenbrook Rd., Stamford, Conn.—Lightweight rubber hose for gas welding apparatus is claimed to withstand great heat and flame and to resist grit, sharp metal and oil. It has a neoprene synthetic rubber cover for flame resistance and a rayon reinforced carcass. Double tubes, one for acetylene gas, the other for

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The Lang Company, Inc., of Salt Lake City, Utah, makers of pressure vessels, uses the Westinghouse 250 KV Mobile X-ray Unit extensively throughout their plant. This mobile unit moves easily to the fabrication site. A complete X-ray inspection is quickly made, and defective welds are replaced at a lower cost than if found after pressure tests.

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Westinghouse has X-ray sales offices across the nation; they are staffed by experienced men who can help you solve inspection problems, and who can demonstrate savings. Call your nearest X-ray representative or write to the address below.

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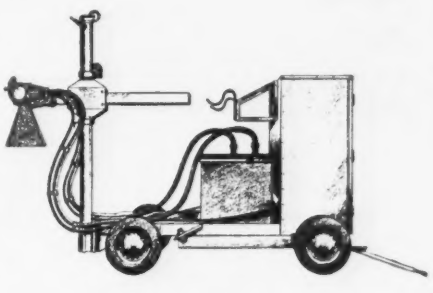

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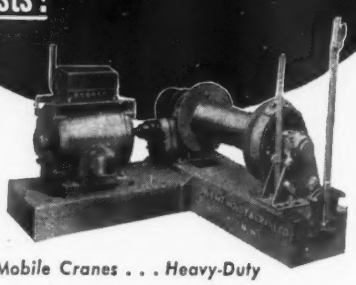

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oxygen, are vulcanized together to form an integrated whole that helps to eliminate twisting and knotting. Working pressure is 200 psi. Hose will be furnished in lengths up to 500 ft and in diameters to fit any type of welding apparatus.

For More Details Circle No. 18—Page 217

Plastic Glove: Edmont Mfg. Co., 1274 Walnut St., Coshocton, O.— Heavy-duty plastic-coated work glove

said to outwear regular plastic as much as two to one is produced by impregnating the company's conventional plastic with a special compound. Glove reportedly has good wet grip qualities that render it valuable for handling materials or tools coated with oil, grease or other slippery agents. Four styles are available: A 12-in., fully coated gauntlet, a fully coated knitwrist, a palm coated knitwrist and the palm coated safety cuff shown here. Fully coated styles are made on curved-finger, wing-thumb pattern with preflexed finger joints.

For More Details Circle No. 19—Page 217

X-Ray Photometer: General Electric Co., Schenectady 5, N. Y.— Redesigned x-ray photometer 4 ft high has all controls centralized on one panel and features an air-cooled x-ray source. For use in nondestructive rapid analysis of many common chemical systems, it can be operated by a technician, thus freeing a chemist from routine work. According to the company's engineers, the photometer cuts analysis time to a few minutes with quantitative accuracies of 1 per cent or better. Results are independent of physical form and chemical composition. Use of x-ray beams of increased cross section and of a new detection system obtains greater resolution sensitivity and higher instrument precision. A null balance system provides stability

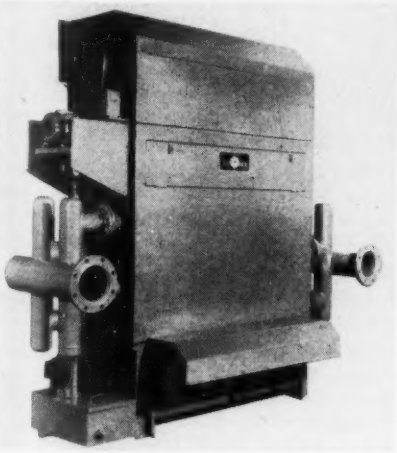
Improved methods of shielding and interlocks help to protect personnel and equipment, and expanded scales allow for easier reading of meters and controls.

For More Details Circle No. 20—Page 217

Iridium Sources: Tracerlab Inc., 130 High St., Boston 10—Iridium radiography sources for the nondestructive testing of steel from ¼ to 1 in. will provide 2 per cent definition and also will give excellent results when used on aluminum and magnesium, the company reports. Average gamma energy of IR-192 is about 450 kev. An active 2 x 2-mm source is sealed in an aluminum capsule attached to a steel head for ease of handling with a remote magnetic handler. Standard source strength is 1.25 curies, and other strengths can be supplied on special order. The low energy gammas of Iridium-192 are said to reveal flaws which are undetectable when high-energy gamma sources are used.

For More Details Circle No. 21—Page 217

After Cooler: Niagara Blower Co., 405 Lexington Ave., New York 17—Improved design of after cooler for compressed air used in operating pneumatic tools or for sand blasting is reported to increase cooling capacity from 25 to 175 per cent over that of previous models. Cooling is



done by the evaporation of recirculating water sprays on the surfaces of tubes through which the compressed air passes. Increased capacity is gained by improved distribution of the compressed air in the machine and an increase in the amount of evaporating surface. The equipment is designed for installation outdoors to provide cleaner compressed air and to save space inside. The cooling medium is air at the atmospheric wet bulb temperature, which is cooler than the average summer temperature of surface cooling water.

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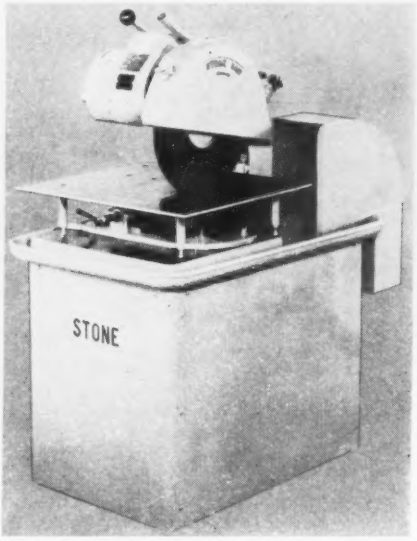
Because the compressed air is always cooled below the atmospheric dry bulb temperature, condensation in compressed air lines is prevented and damage to pneumatic tools, paint sprays and plant processes is avoided.

For More Details Circle No. 22—Page 217

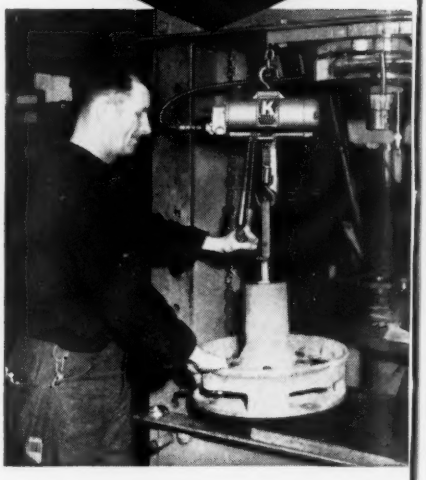
Cutoff Machine: Stone Machinery Co., 506 Fayette St., Manlius, N. Y.—Heavy-duty unit can be used as a reguar cutoff machine or be converted in five minutes for freehand cutting of gates and risers from nonferrous castings and for other uses. When it is used as a regular cutoff machine, either abrasive blades for cutting ferrous materials or semi-high-speed steel saw blades for cutting nonferrous materials can be used. Capacity as a cutoff machine is 2½-in. solids and 4-in. pipe, tubing and structurals. Machine is equipped with a 7½-hp, geared-in-head motor. Direct drive delivers full power to the cutting wheel. All materials can be cut at a rate of less than four seconds per square inch of metal.



For More Details Circle No. 23—Page 217

Graphite Ingot Molds: National Carbon Co., Division of Union Carbide & Carbon Corp., 30 East 42nd St., New York 17—Company's line of graphite pig ingot molds has been changed and standardized to permit quick deliveries direct from stock or, in emergencies, by quick machining. For use as over-metal molds and for casting many special shapes, they are asserted to have the following features: Low initial and operating costs; smooth, clean, uniform ingots or other shapes without chemical contamination; no sticking; light weight and portability; resistance to cracking, chipping, spalling, fire-checking or warping; immunity to

can't burn out when stalled



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KELLER Air Hoist
with positive displacement piston-type air motors

VARIABLE SPEED from 0 to 17 fpm permits safe handling of fragile loads. The load hook can be "inched" up or down for accurate spotting.

LIGHTWEIGHT—A 1,000-lb capacity hoist weighs only 30 lb—easy to carry up or down a ladder, and move from job to job.

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LOW MAINTENANCE because of simple design. Only a few working parts, and these are fully enclosed. Two grease fittings lubricate all working parts.

CONTINUOUS DUTY—Keller Air Hoists can be used continuously over periods of hours (or days) without danger of shortening motor life.

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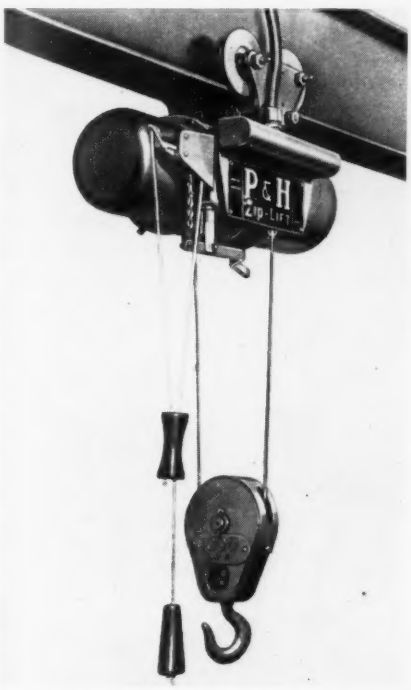
severe heat shock; elimination of mold wash coating and preheating; and easy machinability.

For More Details Circle No. 24—Page 217

Roof Exhausters: General Blower Co., 8603 Ferris St., Morton Grove, Ill.—Centrifugal fan type roof exhauster for air and fume exhaust against static suction consists of a motor-driven fan in a weatherproof housing. Frame is of welded structural steel, the motor mount and shaft support are of heavy plate and the housing of galvanized iron or other metal. Specific types are designed for foundries and other industrial buildings in which a considerable amount of oil, dust and fumes is in suspension in the air. Various sizes and capacities are manufactured to meet particular requirements. They can be used for air exhaust or intake, either with or without duct systems.

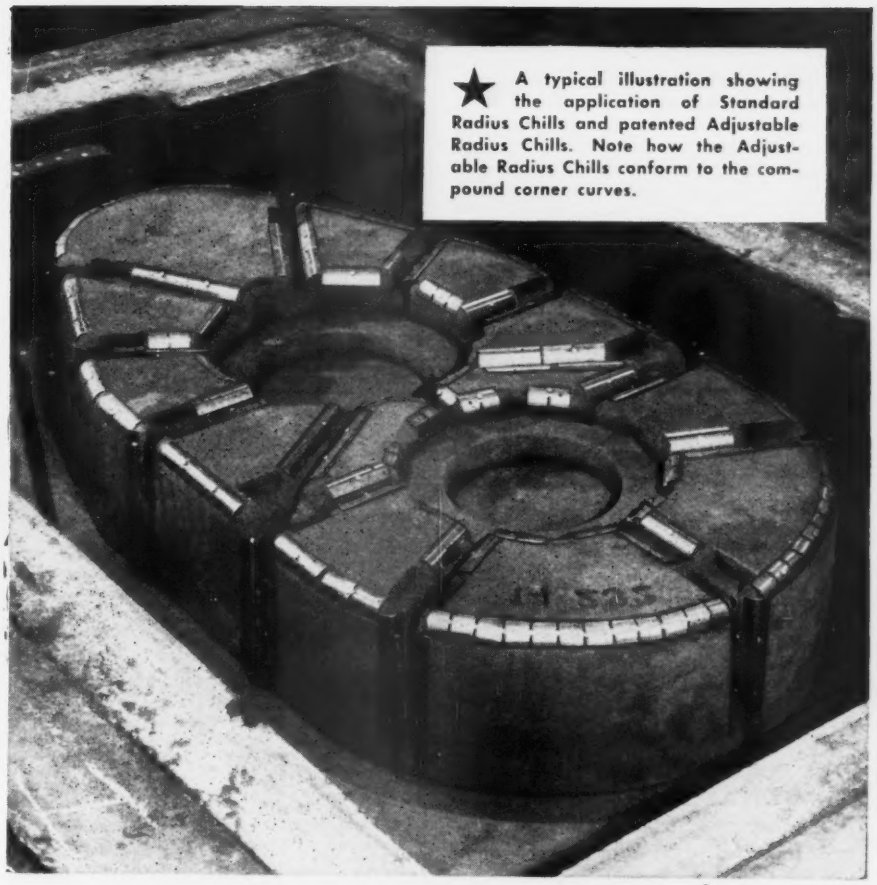
For More Details Circle No. 25—Page 217

Electric Hoist: Harnischfeger Corp., Milwaukee 46—Electric hoist with rope control is designed with a weight-overload safety factor of five times the rated capacity and is guaranteed to operate continuously during intermittent usage for a period 25 per cent longer than the rated time limit. Features include wire



rope hoisting, double brakes, oil bath lubrication, fully enclosed construction and grease packed bearings. Two models are available, with lifting capacities of 500 and 1000 lb and with hoisting rates of 25 and 13 fpm. Both models are available with 12 and 18-ft lifts.

For More Details Circle No. 26—Page 217



★ A typical illustration showing the application of Standard Radius Chills and patented Adjustable Radius Chills. Note how the Adjustable Radius Chills conform to the compound corner curves.

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Milwaukee straight section Radius Chills have been used to considerable advantage on straight fillets and edges in many leading steel foundries. The new patented Adjustable Radius Chills, with equally spaced slots so that sections may be cut off in one inch segments, fulfill the need where chills are necessary along the fillets of cylindrical, round, or irregularly shaped castings. These Adjustable Chills have effected substantial savings in welding and cleaning costs.

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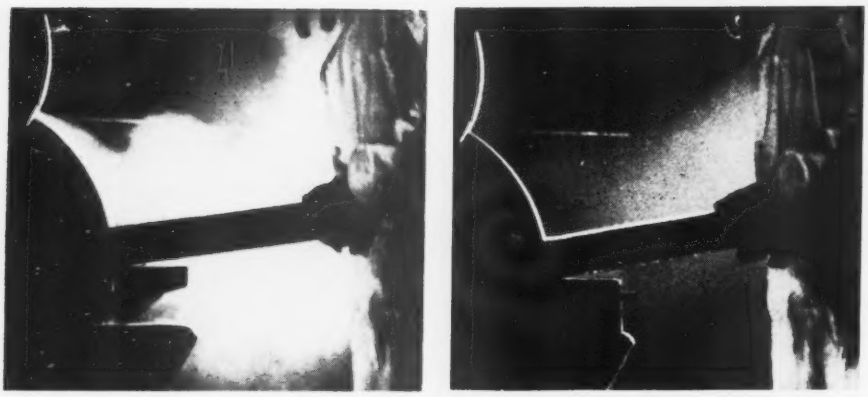


Fig. 1—Smoke cloud forms as wood is ground on the conventionally designed machine on left, whereas modified machine on right eliminates it. Glare over the operator's hands in right view is caused by lighting, not by dust

New Grinder Hood Design

IMPROVES DUST SUPPRESSION

OUTSTANDING improvement in dust suppression on stand or pedestal grinding machines used in foundries has resulted from work sponsored by the British Steel Founders' Association. This improvement applies equally effectively to units with wheels of high (9000 fpm) and of medium (5400 fpm) peripheral velocity.

The devices developed can be fitted easily to both existing machines and to new equipment. The modifications reduce considerably the amount of dust escaping into the foundry atmosphere with conventional hoods (Fig. 1).

Research work leading to these improvements was carried out at the Dust Research Station established in Sheffield, England, by the Research & Development Divison of the BSFA in 1951 and was sponsored by the Committee on Industrial Health of the British Steel Founders' Association.

The work was conducted with the co-operation of the Foundry Trades' Equipment & Supplies Association and of its Ventilation Committee, through which various makes of 24-in. stand grinding machines were made available for experimental purposes.

Prelimary observations at the Dust Research Station were conducted using Perspex end covers fitted to standard 24-in. grinding units. These made it possible to observe the flow of dust-laden air inside the machine cowling under appropriate conditions of illumination. Observations revealed that air streams drawn into conventionally designed machines prevent dispersion within the cowling of the stream of dust-laden air that grinding produces. This condition causes the dust to adhere to and rotate with the periphery of the grinding wheel, instead of being extracted through the exit-duct to the dust collector and fan system.

The dust stream adhering to the wheel emerges from the cowling in front of the operator and subsequently is deflected by the work rest and by the work itself directly into the operator's breathing zone.

By controlling the ingress of air drawn into the cowling by the extraction system and by concentrating the effects of extraction solely upon the dust-stream, the designer can reduce substantially the amount of dust-laden air that rotates with the wheel and evetually reaches the operator. Measures adopted involve the design of a work rest that applies the effects of the extraction system directly to the underside of the work rest itself, and brings the extraction as near to the source of dust-generation as possible.

Further modifications include reducing to a minimum the gap between the casing and the sides or flanks of the grinding wheel and including an easily adjustable "gap-closer" at the point where the wheel emerges from the cowling immediately in front of the operator's face. This gap then can be closed readily by the operator as the wheel wears.

At the same time, the work rest has been altered to embody slots or perforations which, together with the suction applied below the work rest, effectively prevent the work rest from acting as a stripping mechanism for deflecting the dust stream toward the operator's breathing zone before it enters the cowling. Complete recommendations are shown diagrammatically in Fig. 2

In achieving their objective, researchers made modifications so that control of the dust occurs as nearly as possible to the dust origin. They have confined the dust stream within the cowling itself and have required no complicated innovations or alterations to the construction of stand grinding equipment.

The latter criterion has been regarded as of prime importance and has been rigidly observed throughout the work. Only in this way could

(*Concluded on page* 228)

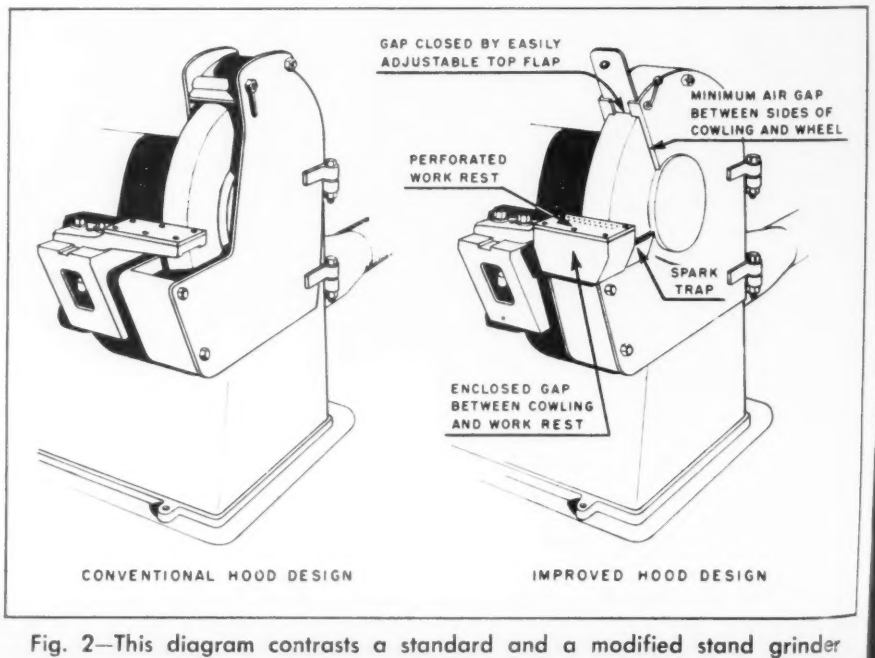
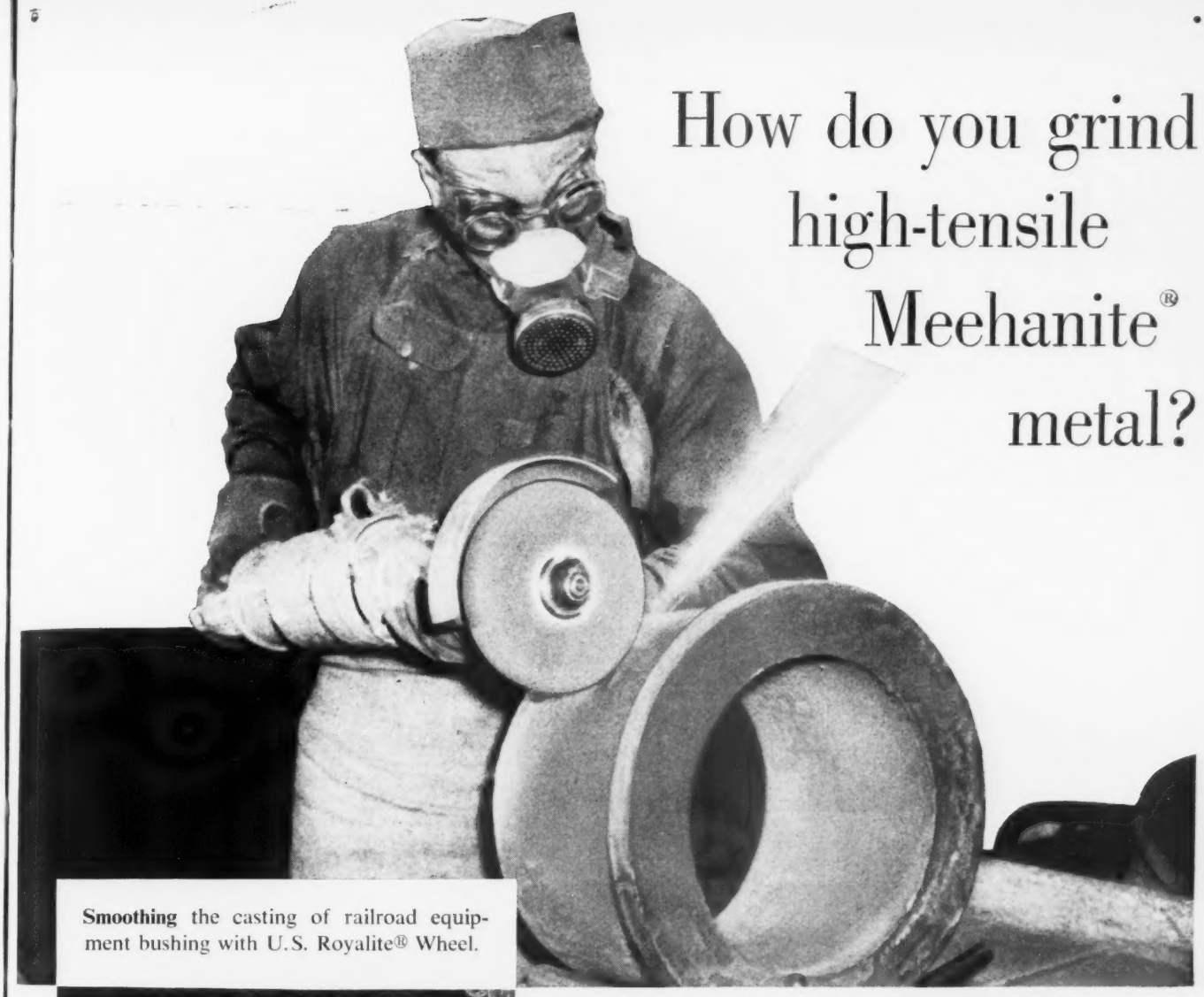
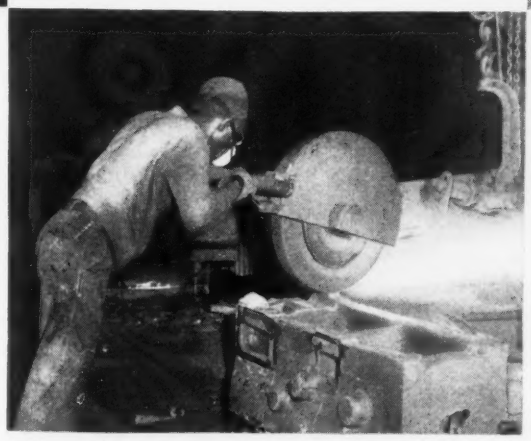

GAP CLOSED BY EASILY ADJUSTABLE TOP FLAP
MINIMUM AIR GAP BETWEEN SIDES OF COWLING AND WHEEL
PERFORATED WORK REST
SPARK TRAP
ENCLOSED GAP BETWEEN COWLING AND WORK REST
CONVENTIONAL HOOD DESIGN
IMPROVED HOOD DESIGN

Fig. 2—This diagram contrasts a standard and a modified stand grinder

How do you grind high-tensile Meehanite® metal?



Smoothing the casting of railroad equipment bushing with U.S. Royalite® Wheel.



Swing grinder removing head from Meehanite metal casting.

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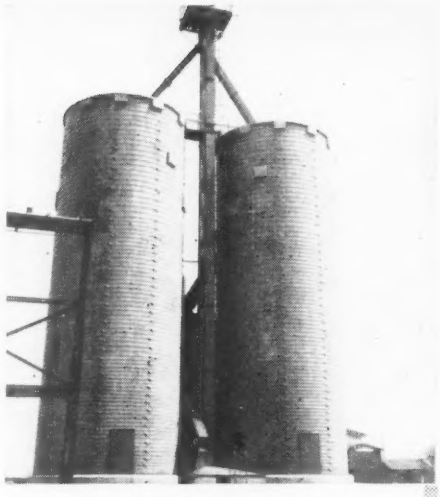
2 of the 5 Neff & Fry Silos at Detroit Stoker Co.



These two 20′ x 55′ Neff & Fry Silos are used for handling coal at the Detroit Stoker Company's Monroe, Mich., plant. Three others, each 14′ x 40′, are used for handling foundry sand. As usual, we collaborated with the machinery manufacturers in designing the conveying equipment.

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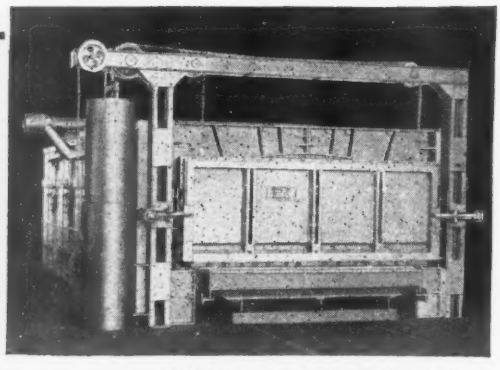

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ENGINEERS & MANUFACTURERS OF INDUSTRIAL HEATING EQUIPMENT

(*Concluded from page 226*)

any design improvements evolved be applied quickly to existing machines at small expense.

Similary, manufacturers can markedly increase the inherent efficiency of new equipment with minimum design changes and a minimum increase in production cost. The British say it is likely that new stand or pedestal grinding units for all sections of the foundry industry, will incorporate these basic modifications.

Reports Cover New Alloys

Processes for producing new corrosion and high temperature-resistant alloys are described in a group of government research reports reviewed in the March issue of "Bibliography of Technical Reports." The following reports cover studies made at Battelle Memorial Institute and are available from the Library of Congress, Publication Board Project, Washington 25.

"Development of Titanium-Base Alloys"—Progress report, July 1 to Aug. 31, 1950, microfilm $2, photostat $3.75. Progress report, Sept. 1 to Oct. 31, 1950, microfilm $2.25, photostat $5. Progress report, Nov. 1 to Dec. 31, 1950, microfilm $3, photostat $8.75.

"Molybdenum Alloys and Protection by Cladding"—Microfilm $6, photostat $20.00.

"Investigation of Molybdenum and Molybdenum-Base Alloys made by Power-Metallurgy Technique"—Progress report June 1 to Sept. 1, 1950, microfilm $3.50, photostat $10. Progress report Sept. 1 to Dec. 1, 1950, microfilm $3.50, photostat $10. Progress report, Dec. 1, 1950 to Mar. 1, 1951, microfilm $3, photostat $8.75.

The "Bibliography of Technical Reports" sells for 50 cents a copy, yearly subscription, $5, and may be purchased from the Office of Technical Services, U. S. Department of Commerce, Washington 25, or through Department of Commerce field offices.

Book Review

ASTM Standards 1952, *Part* 3, *Cement, Concrete, Ceramics, Thermal Insulation, Road Materials, Waterproofing and Soils*, cloth, 1634 pages, 6 x 9 in., published by the American Society for Testing Materials, 1916 Race St., Philadelphia 3. Price $12.

Contains 404 standard and tentative specifications, methods of test, and definitions of terms relating to cement, concrete, ceramics, thermal insulation, road materials, waterproofing and soils which are arranged under 20 materials subdivisions for easy location. Printed on bible paper to reduce bulk, text is arranged in double-column format for easier reading. Specifications, etc., are indexed under material classification, in numeric sequence, and under subject which provide quick location of any specific item.

High Pressure Molding

(*Concluded from page* 148)

stroy the close casting tolerance. Casting tolerance is apparently limited only by the accuracy of the pattern equipment.

Gating problems seem to be similar to those for shell molding. The metal must be choked ahead of the ingate. Metal flow must be relatively free from turbulence. Cooling rate in the high density mold is retarded as compared with ordinary molding methods. This may require changes in risering or feeding practice in larger castings. These important details must be worked out more extensively before the process can move from laboratory success to commercial success. In the meantime, operations on a pilot plant or restricted commercial level continue to expand as rapidly as molding equipment and improved bonding resins become available. At the present time, this phase of the work indicates real promise of an economical and practical tool for producing castings to closer pattern tolerances with molding equipment only slightly modified from standard techniques of the modern foundry.

Molds Made in Coreboxes

Internal cores have not been covered by this preliminary discussion because the castings produced in the laboratory foundry have not included cores. However, the molds produced usually have been made in core boxes rather than flasks. They are then handled and assembled in much the same manner as baked cores. Therefore, there is every reason to assume that green sand cores made by the same process and materials could be substituted for baked sand cores for many sizes and shapes. Shell cores could be used with ease since the resins in the burnt shell core sand are compatible with the high pressure resins, and core sand dilution would be at a minimum. Ordinary oil or resin cores could be used when normal tolerances are permitted.

Used high pressure sand may be bonded with special materials already developed to permit baked cores composed partially or entirely of reclaimed sand. The exact type of core practice will depend upon requirements of the casting and the economy of the various techniques available. In any case, the base sands chosen for the internal cores will have to be of essentially the same fineness and screen distribution as the desired high pressure sand. If this precaution were not followed, the core sand dilution would reduce rapidly the fineness of the molding sand and detract from the finish and casting tolerance desired.

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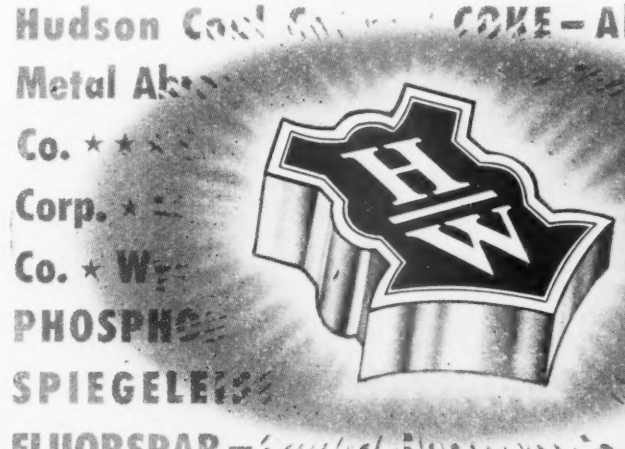

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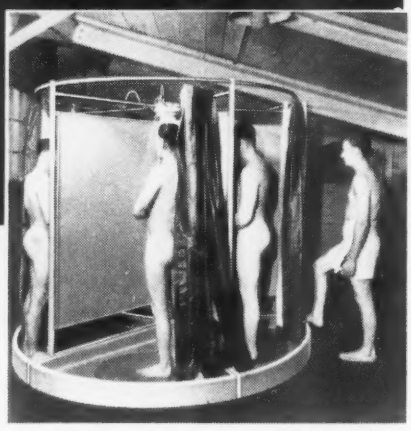

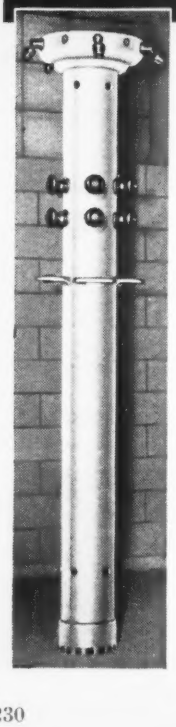

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IBF Holds Annual Meeting

(*Continued from page* 177)

He pointed out that the properties and soundness of metals still limit the efficiencies and outputs of various kinds of equipment. Of a great accumulation of scientific knowledge, he said, much is not being used correctly or at all by operative craftsmen; on the other hand, certain scientists still fail to understand production procedure. The institute is fortunate, he stated, in the co-operation it has been given by eminent scientists and technologists who have added luster to the science of metallurgy, especially to the metallurgy of cast metals.

Mr. Longden emphasized that the improvement of craftsmanship depends to a large extent on its practitioners' ability to absorb scientific and technological discoveries and mechanical developments and on a willingness to accept a scientific organization of production. The most successful foundries have based their activities on scientific research and technological endeavor and have adapted themselves to new sources of knowledge. During the past two decades, a great awakening has taken place regarding the efficient training of scientific and technological leaders. Today, he went on, modern educational facilities are adequate to the needs, and an excellent flow of informed men is now being released.

Technical Council Is Busy

The president referred to the activities of the Technical Council of the institute, members of which are making considerable contributions to the store of foundry knowledge knowledge gained from close contact with the realities of casting manufacture. The result of the work of the technical council has been recorded in some 36 valuable reports, and at the present time there are some 15 investigations in progress on various phases of ferrous and nonferrous foundry metallurgy and practice.

This work involves over 150 selected technologists. The council is a center for co-ordinated study of foundry work and its product, the casting—study not only for improved quality, but also, indirectly, for the achievement of the increased productivity. The speaker gave a word of warning against overspecialization and stated that the qualifications of a leader in the foundry should include a minimum of general knowledge.

Mr. Longden mentioned that in the United States, the increase in the rate of productivity during the past decade, measured in output per man-hour, is equal to doubling the output in 26 years. In 1900 there was one

engineer to 250 industrial workers, but today there is one to every 60 workers. Chemists have doubled in numbers in 15 years and physicists in 8 years. The number of scientists, technologists and engineers in industrial and government research laboratories was four times as large in 1952 as in 1932. Science and technology therefore are the "pathfinders" to industrial efficiency.

The Edward Williams Lecture was delivered by E. W. Colbeck, metallurgical and research director to the Hadfield group of companies and director of Hadfield Steels Ltd. and Hadfield Forgings Ltd. His subject was "Aspects of Nuclear Fission of Interest to Foundrymen and Metallurgists." The main topics were nondestructive examination by means of radioisotopes; the use of radioisotopes as tracers in metallurgical processes and in physical metallurgy; nuclear energy as a source of power; and some problems connected with construction materials for atomic piles.

Technique Is Not New

Of the three types of discernible radiation emitted by radioisotopes, only gamma rays penetrate metals sufficiently to be useful for the radiography of castings. The author pointed out that radiography is not a new technique. About 1918 the pioneer work for radiography in the foundry was carried out with x-rays by Sir Robert Hadfield, Dr. Main and their collaborators at the Hadfield Research Laboratories.

Even gamma radiography is not entirely new. Its potentialities have long been appreciated because of the ready portability of the equipment for site radiography of heavy castings and because gamma sources can be placed at places within castings where it would be impossible to position an x-ray tube. In the author's laboratories, radium and radon gas sources of gamma rays have been used for the last five years. Radium and radon gas have disadvantages which largely are overcome by the use of radioisotopes. Cobalt-60, with a half life of over five years, has an activity per unit source volume that can be made more than ten times that of the best value for radium sources.

Cobalt-60, however, emits very penetrating rays that render it unsuitable for less dense metals than steel or for thin sections. Research is being made on cesium 137, which has a half life of more than 30 years and emits softer radiations. The new radioisotopes require a much smaller financial outlay than x-ray apparatus, have greater penetrating power and can cover a casting in fewer shots

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Photos courtesy of Blackhawk Foundry Company, Davenport, Iowa.

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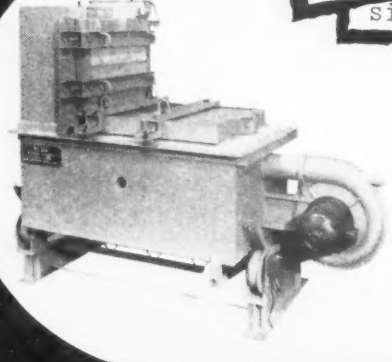

Reda Stack-Loading melting furnaces for ferrous and nonferrous metals have been designed and built by experienced foundrymen for foundrymen everywhere. That is why Reda furnaces provide advantages far beyond those found in other, and more expensive types; that is why, with Reda furnaces there is less down time for maintenance, longer uninterrupted melting runs, and lower melting costs.

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than are required with x-rays.

The author stated that the use of these new isotopes is providing foundrymen with a rapid and relatively inexpensive method of checking new designs of castings before going into fullscale production. In many instances they are indicating ways in which old foundry methods can be improved, particularly in respect to obtaining higher yields of metal. During the past two years, some 500 investigations have been carried out at the author's works laboratories, and in nearly every instance appreciable savings have been achieved.

The author made reference to the relatively new method of radiological scanning, which eliminates the use of photographic methods by traversing the specimen with a gamma ray beam, the intensity of which is recorded by Geiger-Muller or scintillating counters. Crack detection by dipping the specimen in radioactive solutions is another use of radioisotopes, a method which is similar to the old oil and chalk method.

Need Special Training

The lecturer passed on to the use of tracers, which make it possible to study almost exclusively and with great sensitivity the radiation from one selected type of atom in the system. This method should enable foundrymen to trace impurities in castings to their original sources. It it necessary, however, to be assured that the radioisotope used as a tracer does not itself affect the properties of the medium which is under observation, and a study also must be made as to the medical hazards involved and the means necessary to overcome them. Special training is required therefore by the operator.

The author explained these points by examples classified into three types of tracer experiments: Physical indicators, indicators of chemical traces and chemical indicators. In some cases, it is almost impossible to satisfy the conditions required to obtain correct results. Trying to trace dust is a case in point. Radioisotopes were used as indicators of chemical traces in connection with theories of desulphurization of iron by slag. It was found that the sulphide reaction does not occur in the metal. Chemical indicators provide the only technique which permits the study of auto-diffusion. Tracers also enable steel to be "traced" through casting, heat treatment and other processes—a useful technique, for example, in the study of segregation in steel ingots.

The speaker closed with a brief review of the possibilities of nuclear energy in which he mentioned that

it is now thought that a small reactor capable of producing useful power for an undeveloped area could be built for approximately $6 million. Dealing also with the question of materials for the atomic pile, the lecturer mentioned that the foundryman of the future may well find himself in the position of being asked to cast alloys that are not of his own selection and will involve the development of new techniques to obtain the required soundness.

The 15 technical papers presented at the convention will be reviewed in next month's issue.

Diffraction Conference To Be Held Nov. 5-6

The eleventh annual Pittsburgh Diffraction Conference will be held at Mellon Institute, Pittsburgh, Nov. 5-6. Technical sessions are being arranged on instrumentation and methods, metals, recrystallization and preferred orientation, structure of polymers and general diffraction subjects.

Contributed papers will be considered in the order in which they are received. Titles should be submitted to the program chairman, E. E. Wicker, United States Steel Corp., Research and Development Laboratory, 234 Atwood St., Pittsburgh 13, before Sept. 1. Abstracts will be due Sept. 21. Requests for further information and a copy of the preliminary program should be addressed to Dr. H. R. Letner, Mellon Institute, Pittsburgh 13.

Westinghouse Builds New Research Center

Westinghouse Electric Corp. has broken ground for a new electrical industry research center on a 70-acre plot about 10 miles east of downtown Pittsburgh's Golden Triangle. Scheduled for completion early in 1955, the new center will be housed in an L-shaped, three-story building. Dr. R. C. Hanna, associate director, Westinghouse Research Laboratories, is co-ordinating design and construction of the new facilities.

The center will be approximately one-third larger than present laboratories and will provide room for future expansion. In addition to laboratories and offices, the structure will house an auditorium capable of seating about 250 persons, a cafeteria of similar size and a large technical library. The new center ultimately will replace present company research facilities, which are only a few miles from the new site.

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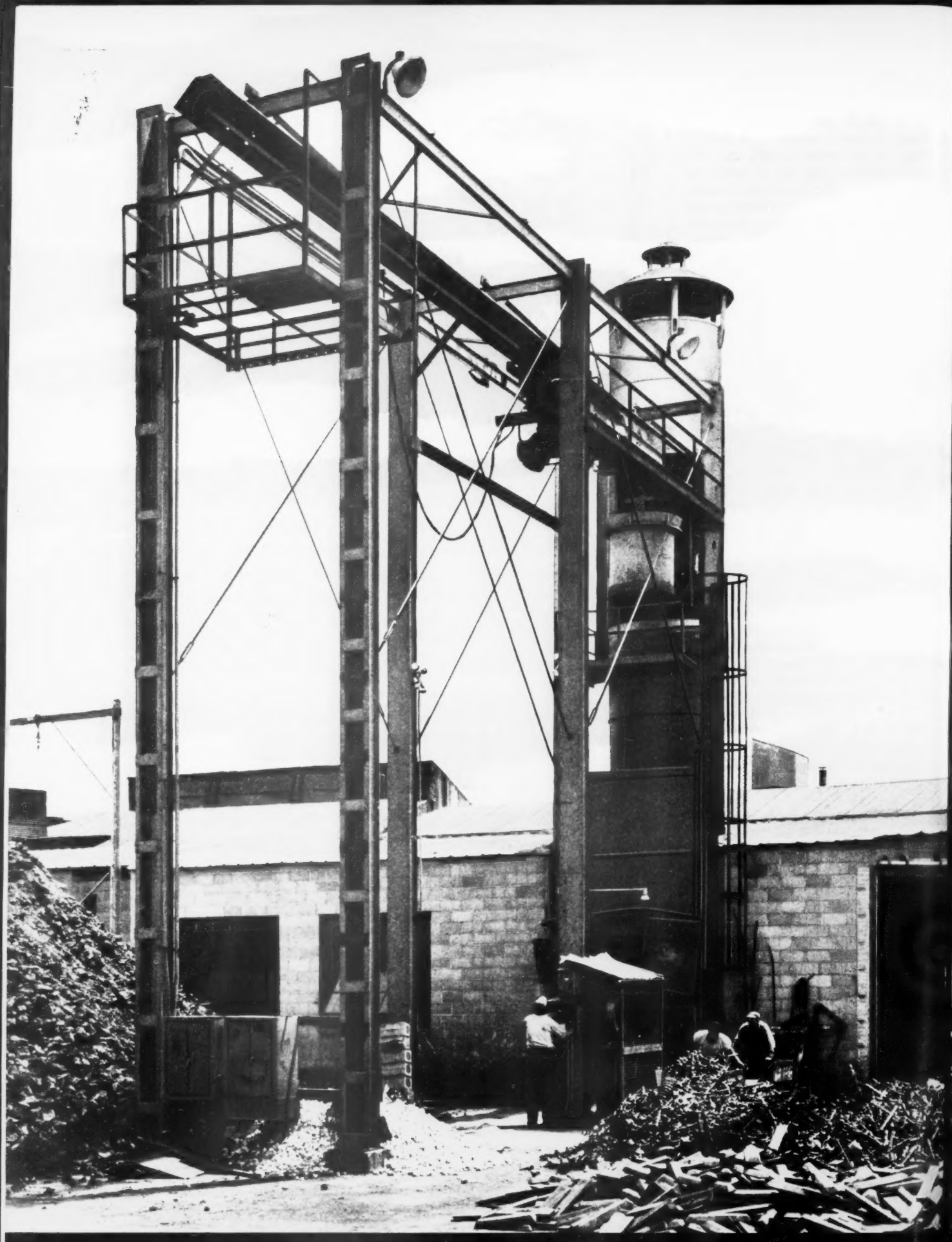

Trambeam Charging Crane lifts loaded full-cone bottom bucket into cupola with precision controlled speed. "Wish-bone" in stack holds bucket as cone bottom drops to effect even distribution of charge, resulting in a better melt and improved casting quality.

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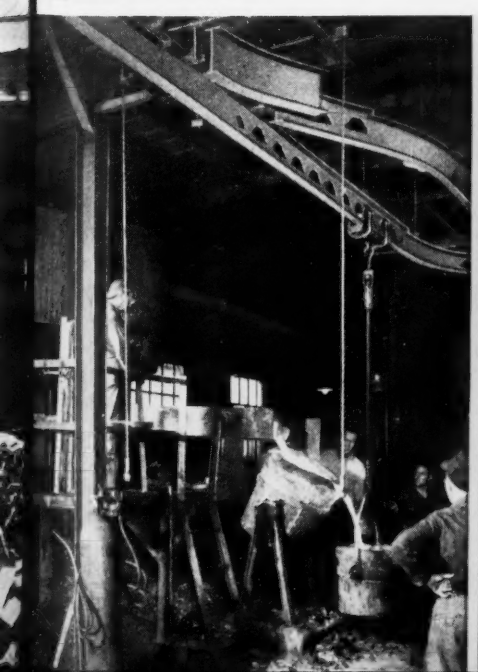

Whiting No. 8 Cupola is tapped into Whiting reservoir ladle, then metal is poured into receiving ladles suspended from Trambeam hand-pushed carrier for monorail transport to pouring room. Trambeam switch near cupola expedites passage of incoming and outgoing ladles.

Trambeam Monorail System has helped Midwestern to speed metal handling by providing quick access to all pouring areas. Two manually-operated switches control a "double track" passage down main aisle so that full ladles need not wait for return of empty ladles.

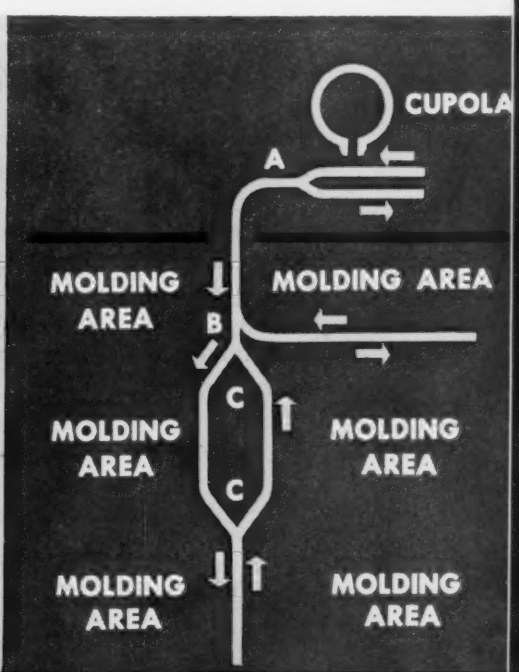

Diagram Shows Layout of Trambeam monorail system from cupola to pouring stations. A—Trambeam switch controlling ladle "traffic" at tapping station. B—Switch to spur line for pouring in adjacent areas. C—By-pass switches control ladle passage on "double track" monorails.

Nonferrous Practice

(*Continued from page* 110)

risers are popular in brass and bronze foundries since they may reduce cleaning time by 50 per cent. Necked risers use sleeves of graphite or gypsum which separate casting and riser except for a small central neck which feeds the casting from the riser. With gypsum sleeves risers 30 per cent smaller than those required for gravity feed can be used.

Insulating sleeves for risers and insulating pads for thin sections used to carry metal to heavier sections are being used to improve feeding and increase yield. One such insulating mix consists of equal parts by weight of water and gypsum to which has been added 20 per cent of portland cement. This mixture is poured into metal molds to form pads or sleeves, air dried 2 hours, then dried 10 hours at 500° F. Asbestos instead of sand is also sprinkled on risers for insulation. Because of the high specific heat of sand it absorbs heat rather than insulating the metal that fills the riser cavity.

Attention also is being directed toward letting the atmosphere help feeding as much as possible. This calls for open risers, or use of cores to reach from blind risers to the atmosphere. Also being investigated is high-presusre feeding by enclosing in the feeding head a small capsule containing elements which, after a short delay, liberate both heat and an inert gas under pressure. This has been found to give yields of 75-90 per cent as compared with 60 per cent by gravity feed. This type of feeding has proved quite successful in ferrous work.

General Comments—One common complaint in nonferrous foundries is unsoundness and leakage due to porosity. Extensive investigation has shown that this results from localized shrinkage or microporosity where interconnected voids, or channel porosity, exists. It does not result from pinhole porosity since such voids are scattered and not interconnected. This type of localized shrinkage often is accentuated by gas which forms microporosity in the shrinkage areas. This gas in the shrinkage area hinders entry of liquid metal into the voids and, therefore, prevents feeding even though adequate risering has been provided.

Alloys which solidify to form a substantially solid solution are most susceptible to microporosity. Many of the light metal alloys, and most copper-base alloys, except those containing lead, are of the solid solution type, have little or no eutectic, have a wide solidification range, and are thus subject to microporosity. Lower pouring temperature will reduce microporosity.

The foundryman often notices that shrinkage is less in heats that are gassy. Actually the gas scatters the shrinkage porosity and if it could be controlled might give castings which require less feeding. However, as pointed out above, gas can lead to serious trouble, so it is better to have degassed metal than to try to control porosity.

There is much debate about the relation of test bars to castings. Let us face squarely the fact that test bars are only an index of the quality of metal used for pouring castings and are no indication of casting quality. It would seem that we should forget about trying to get test bars which will reach phenomenal values of strength and ductility by use of all sorts of fancy gating methods. We should start using simple test pieces which will show the cleanliness of the metal, freedom

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from gas porosity, and other characteristics as an indication of metal quality for the foundryman.

The gating used should be simple enough and efficient enough to give results which are reproducible under similar circumstances. The castings will have to stand on their own merits in x-ray examination and under various tests. The test bar should be of most value to the foundry producing the castings and not to delude the customer and lull him to sleep. Give the foundryman a simple, reproducible test specimen which will indicate metal quality and he will have a helpful tool in producing good castings.

Many other things should be considered such as effect of impurities. Since they vary with each alloy, some general suggestions for their elimination might suffice. Buy to controlled analyses and see that the elements stay within range. Establish controls both on sands and metals and keep accurate records of tests and results. Maintain good technical service, including testing. By careful recording and technical analysis many variables can be eliminated and the best practices determined for your specific use.

There is no single right way to do things, but usually a right combination of procedures. The technical man must consider, first of all, what will be best for the particular foundry in question after giving due consideration to the limitations placed upon the foundryman by equipment or policies. If he starts there with the idea of improving methods and casting quality rather than offering a sure cure, he will probably find the foundryman willing to co-operate and do his share. This fairly new teamwork between technical men and practical foundrymen is the real clue to progress in the foundry.

References

1. Eastwood, L. W. and Kura, J. G., "Unsoundness Caused By Gases in Copper Base Alloys," FOUNDRY, May, 1947.
2. Hudson, Frank, "Bronze Founding," FOUNDRY, March, 1948.

Acquires New Facilities

Pekay Machine & Engineering Co., Chicago designers and manufacturers of foundry sand handling and conditioning equipment and other devices, has acquired the entire machine shop and production facilities of Pekay Metal Fabricators. The newly integrated facilities are expected to result in faster, more effective production of the company's line of mullers, aerators, conveyors, elevator conveyor buckets and other equipment.

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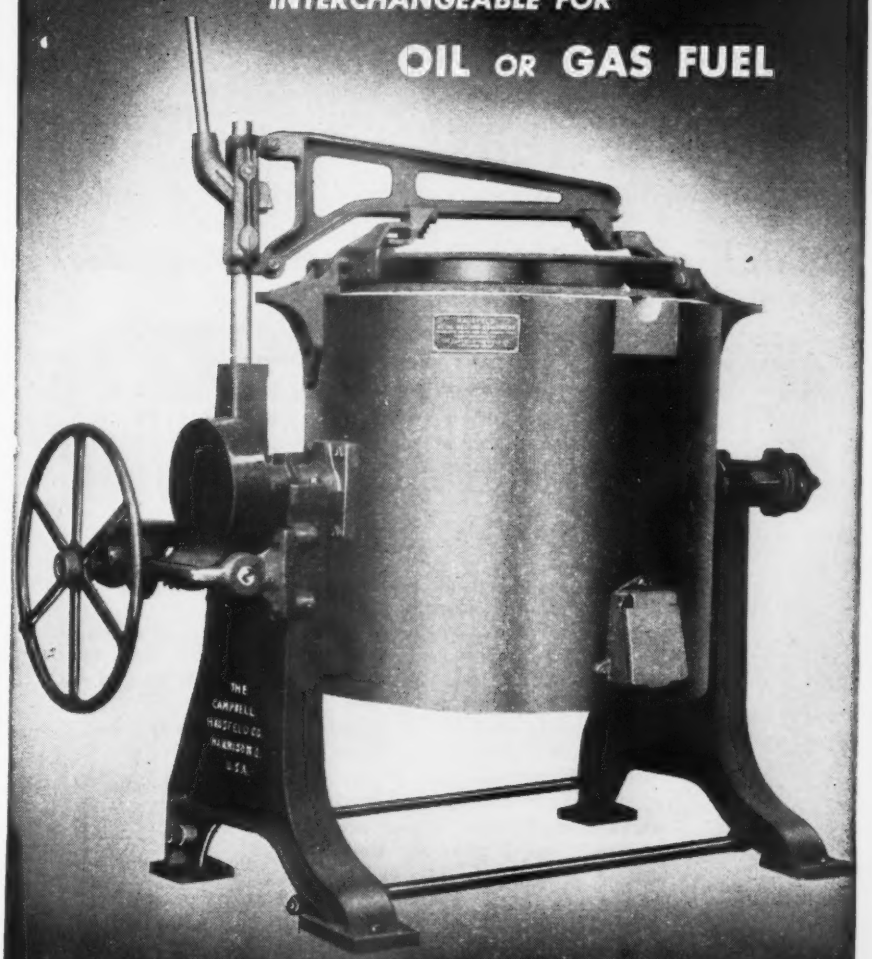

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2504

Conveyor Belting

(*Continued from page* 93)

facing riveted, bolted or vulcanized on the face of the pulley. The rubber covering increases the driving capacity of the pulley by increasing its coefficient of friction with the belt. Magnetic pulleys incorporate either permanent or electromagnets in the pulley face for the continuous, automatic separation of magnetic tramp metal from the material being carried.

A number of drive arrangements permitting different arcs of contact between belt and drive pulley can be used to increase effective tension in the belt. They are shown in Diagram *C*. Plain drives are the simplest and least costly and provide only 180 degrees of contact between belt and pulley. They will handle comparatively small amounts of power. Snubbed drives utilize a small idling pulley so located as to provide more than 180 degrees, and the average runs 200 to 220 degrees.

Tandem drives provide a large arc of contact—usually about 420 degrees. For proper operation they require pulleys of large enough diameter to handle the reverse flexing of the belt under heavy tension, pulleys of exactly the same diameter and thorough cleaning of both sides of the belt before it comes in contact with the pulleys. They are more complicated than other types of drives but permit use of a lighter belt for a given horsepower, and effect other economies that justify their increased cost.

Two general types of take-up arrangements are used to maintain proper tension in the belt—automatic or gravity take-ups and screw or manual take-ups. See Diagram *D*. Automatic take-ups usually are preferred for all but the smallest conveyors because they maintain, constantly, the minimum required tension regardless of starting loads, belt stretch, temperature changes and other variable factors. When screw take-ups are used, the adjustment often is made too tight to be sure that the conveyor will be driven, and to compensate in advance for belt stretch and other changing conditions, which otherwise would necessitate the making of continual adjustments.

Power Requirements — Formulas are used to determine power requirements for the various factors which make up the total power requirement. The formula for determining power to run an empty conveyor takes into consideration belt weight, weight of

the conveyor's moving parts, coefficient of friction of the bearings and speed of belt travel. Table IV shows horsepower required to pull an empty belt on a level conveyor equipped with antifriction bearings at the rate of 100 fpm for specified center distances. Center measurements are distances in feet between shafts of the head and tail pulleys.

Power required to convey material horizontally is computed by a formula which takes into consideration the power absorbing factors used in the calculations above in addition to the weight of the material being carried. Table V gives horsepower requirements for moving various quantities of material horizontally at any speed.

Calculations of horsepower needed for elevating material or generated in lowering it are based on the weight of the material being handled and the net change in vertical disance it is conveyed. Values shown in Table VI should be added to power requirements given in Tables IV and V if material is being elevated, or subtracted if the material is being lowered.

Recommends Angles of Incline

The recommended maximum angles of incline for belt conveyors handling sand are: Bank, 20 degrees; dry, 15 degrees; tempered, 24 degrees. For coke they are: Run-of-oven, 18 degrees; screened sizes, 18 degrees; breeze, 20 degrees.

The horsepower required to move the belt and the material does its work by developing tensions in the belt. Effective tension is the pull resulting from application of power to the drive pulley to move the belt and material. Slack side tension is the pull that must be maintained in that portion of the belt leaving the drive pulley to prevent slippage when power is applied to the drive pulley. Take-up tension is that additional stress in a belt due to frictional losses and pull required to operate a take-up.

An additional allowance must be made for tension required to keep the belt taut throughout its length and to prevent sagging of the loaded belt between idlers. Belt slope tension is encountered only with inclined conveyors and results from the weight of the belt pulling on the pulley at the top of the slope. Maximum tension is the greatest tension present in the belt and is the sum of the contributing tensions just outlined. It determines the minimum required belt strength needed for a

Hedrich-Blessing Photograph, courtesy of the EDWARD HINES LUMBER CO.

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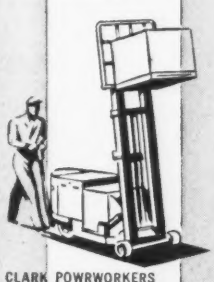
CLARK Attachments



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given installation.

For purposes of approximating belt conveyor requirements for any given installation the sum of effective and slack side tension can be used as maximum tension.

Figuring a Typical Job—The following procedure can be used in estimating belt requirements: The hypothetical problem is to carry unprepared sand from a track hopper into which it has been discharged from gondola cars a distance of 200 ft to the top of a storage bin 30 ft above the ground. Assume the sand weighs 100 lb per cu ft, and it is to be conveyed at the rate of 300 tons per hr. Conveyor idlers are equipped with average type antifriction bearings.

Since sand presents little problem as to lump size, almost any width belt can be used. However, because 300 tons is to be carried per hour, Tables I and II show that a 24-in. belt traveling at a little over 300 fpm is the narrowest belt that can do the job satisfactorily.

From Table IV it is determined that horsepower to run the empty conveyor is 2.4; horsepower to convey the material is found in Table V to be 3.2, and Table VI indicates that 9.1 hp is required to lift the material 30 ft. Total horsepower requirement is 14.7 or approximately 15.

Reference to Table VII shows effective tension required to be 1650. Values in this table are based upon the following formula:

Effective Tension = Horsepower × 33,000 ÷ Speed of belt, fpm

Because automatic take-ups maintain, constantly, the minimum required belt tension regardless of starting loads, belt stretch, temperature changes, and other variables they are preferred to screw take-ups. Assume also that a bare pulley is to be used. Then in Table VIII the drive factor, 0.64, can be multiplied by the effective tension to obtain the slack side tension. Consequently, 1650 × 0.64 = 1056. Sum of effective and slack side tensions then is 2706, which can be considered as maximum tension for purposes of approximating belt conveyor requirements.

Determine Duck Weight

Table IX shows that a four-ply belt is required to convey the sand. Since it is necessary to know the weight of duck to do the job, the answer can be found in computing the unit tension for rubber and fabric belts from the following formula:

Unit tension = Maximum tension ÷ (Belt width × Number of belt plies).

This tension value then can be used to determine weight of duck from the following:

Duck weight, oz	28	32	36	42
Tension value	26.5	30	33	42

Using known values in that formula it may be determined that:

Unit tension = 2706 ÷ (4 × 24) = 28.2.

Since that value is less than the maximum of 30 allowable for 32-oz duck, the 32-oz duck can be used.

The answer to the problem, then, is that the following equipment is required to do the job: A 24-in. belt constructed of four 32-oz duck plies, operated at approximately 300 fpm over a bare pulley plain drive with automatic take-up, 15 hp being required to operate the loaded conveyor.

A lagged pulley with automatic take-up, however, would require a belt with only 4 plies of 28-oz duck. This probably would be the preferable selection. Other ply and duck weight combinations can be determined with Tables VIII, IX and X and the unit tension table above for plain, snubbed or tandem drives to determine the most inexpensive installation to do the job.

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The horsepower requirement referred to above is that of the conveyor only. Power losses occur in the driving machinery, requiring that the conveyor horsepower be increased by certain percentages to offset those power losses. Direct-connected drives employing herringbone speed reducer units or direct-connected geared-head motors require an additional 3 per cent of the conveyor power requirement. Chain drives employing herringbone speed reducers or geared head motors require 8 per cent. A direct-connected drive with worm reducer requires 11 per cent as does a geared countershaft drive. A chain-drive worm-reducer unit takes 17 per cent.

While the information supplied here is sufficient for obtaining an approximation of belt conveyor requirements, materials handling engineering firms should be consulted in tailoring a conveyor installation to any given foundry.

Sources of Material

1. C. O. Bartlett & Snow Co., Cleveland
2. Globe Woven Belting Co., Buffalo
3. B. F. Goodrich Co., Akron, O.
4. Goodyear Tire & Rubber Co., Akron, O.
5. Hewitt Rubber Division, Hewitt-Robins Inc., Buffalo
6. Imperial Belting Co., Chicago
7. Republic Rubber Division, Lee Rubber & Tire Corp., Youngstown, O.
8. Stephens-Adamson Mfg. Co., Aurora, Ill.

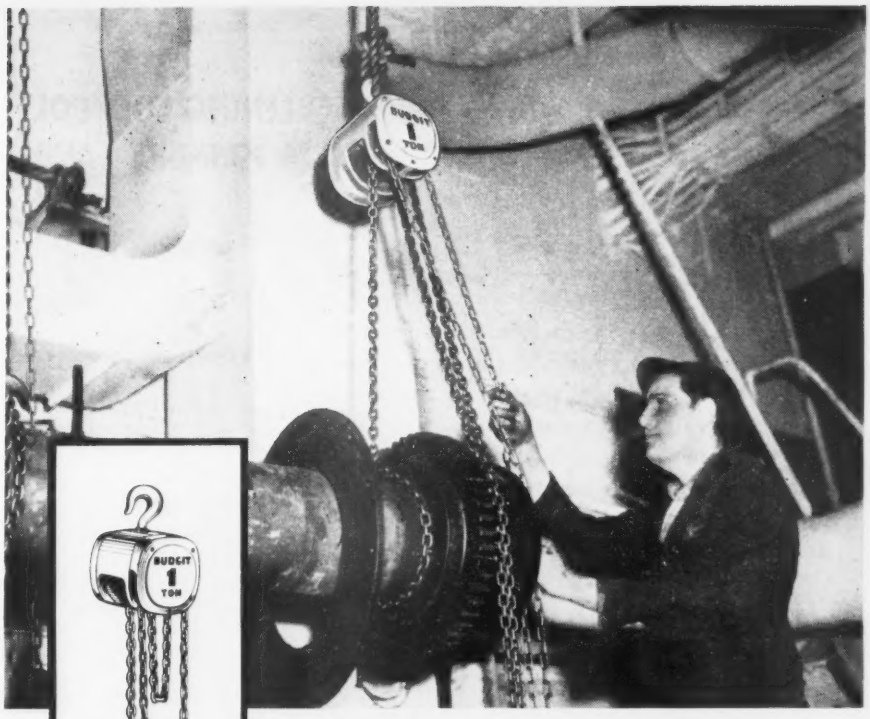
Book Review

Metal Data, by S. L. Hoyt, 2nd edition, 518 pages, 7 x 10 in., published by Reinhold Publishing Corp., New York. Price $10.

Called *Metals and Alloys Data Book* in the first edition, this book includes both the most recent information available on material covered previously and new data on such topics as hardenability of H-steels, development of super alloys for high-temperature stress members and similar subjects.

Because the volume was designed to present information, not to instruct, important data were collected from reliable sources and brought together so that engineers and metallurgists can refer to them conveniently and quickly. Most of the material is offered in tabular form with a minimum of descriptive text.

Nearly 700 tables and graphs contain useful working information on such metallic properties as tensile strength, hardenability, thermal expansion, creep strength, endurance limit and yield strength at normal, subnormal and elevated temperatures and for various conditions of mechanical treatment. Special features include a listing of commonly used test bars, hardness tests, corrosion data, conversion factors, applications of material and the properties of elements.



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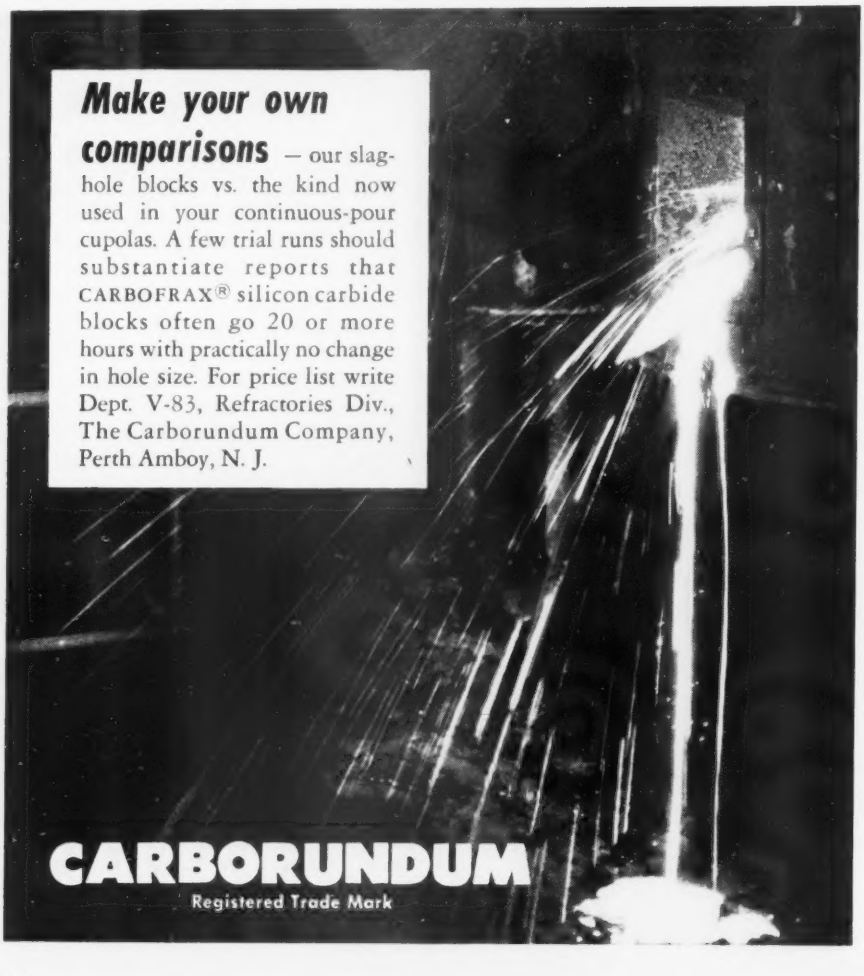
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How To Build Good Will

(*Continued from page* 111)

regarding air contaminants issuing from the foundry. Both F. W. Guckelberg, vice president, and E. R. Vanover, general superintendent, spent a day visiting housewives in the vicinity. Many of the women took dishes from their cupboards and invited the men to run their fingers across them. Result was dirty fingers and a clean line across a dirty plate.

The men agreed with the women that housekeeping under such conditions was an onerous task. Immediate steps were taken to reduce emission of air contaminants from the foundry. No further complaints were heard, but housewives had the opportunity to meet top management of the foundry and present their story directly. Their problem was appreciated and something was done immediately to eliminate the situation—direct co-operation in solving a reasonable complaint.

So when part of the foundry's operation was moved to the new plant the installation of cupola fly ash and dust collectors was included in the original plan. However, the installation was not completed on both cupolas until a little over two years after the foundry was put into operation. During that time a neighbor who operated a produce farm in the new location dropped into the office one day to inquire if the company could do something about soot and fly ash being deposited on his property. He felt that his crops might be affected adversely. Yet he was hesitant about incurring the ill will of the company because many of its employees bought fresh vegetables from him. Mr. Guckelberg left the office with the man to inspect the sooty deposits. Upon being assured that equipment to eliminate the problem was being installed the man was satisfied and patiently awaited the day when it was put into operation.

Employee Promotions — Advancement of employees gets the same careful attention, although there is a similar lack of formal plan. Management keeps a careful eye on employees in the office and in the shop. When an employee shows signs of ambition, a desire to better his position in the organization and a willingness to do a little extra work to achieve his goal, management takes co-operative action.

What are some of the signs that arouse management interest? One of them, for example, is attendance

at night-school classes or participation in some other form of educational program by an employee. Another is demonstrated by an employee who shows sincere interest in the company's progress by turning out high-caliber work on the job he is doing as opposed to the attitude of doing only enough to "just get by" or by turning out a product that is "good enough."

Another is exemplified by curiosity —learning something of the other jobs around and ahead of the one being performed. The idea is to discover how an individual job fits into the overall picture and to demonstrate an eagerness to move along rather than be pigeonholed. In other words, by doing a conscientious job instead of merely "putting in time" at the shop or office.

When such signs are shown by an employee, he is marked by management for placement in the next job opening that develops. In many cases an opening is created. For instance, such an employee will be made assistant to a foreman or department head, thus creating an opportunity for broader education through personal teaching. Furthermore, responsibility and authority are delegated unhesitatingly to the advancing employee so that he does not get the idea that the advancement is a hollow victory.

Trained Men Take Over

The company's intention is to create an embryo supervisory force so that if any man in a supervisory position is lost for one reason or another there is a man trained to take over his job with little or no disturbance to the operation.

Charles Louden, plant engineer at the Tibbs Ave. foundry, is an example of employee advancement. He is a comparatively young man and started working for the company at the end of World War II. At the companys' old plant on Naomi St. Mr. Louden worked at a number of different jobs, such as assistant engineer and master mechanic, ultimately being made assistant to Mr. Vanover to relieve the latter of many routine duties. In the new position he learned much about company policies and plans and when the new plant was built he was named plant engineer. Now he is training a man who in the future may take over his job.

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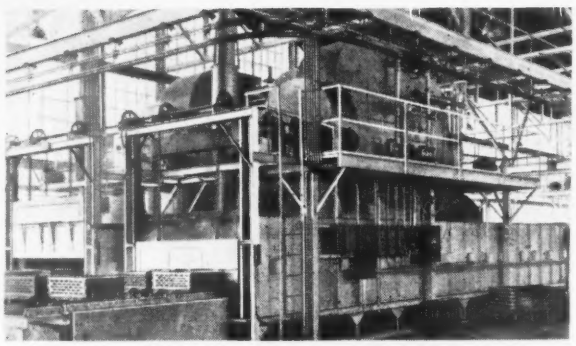

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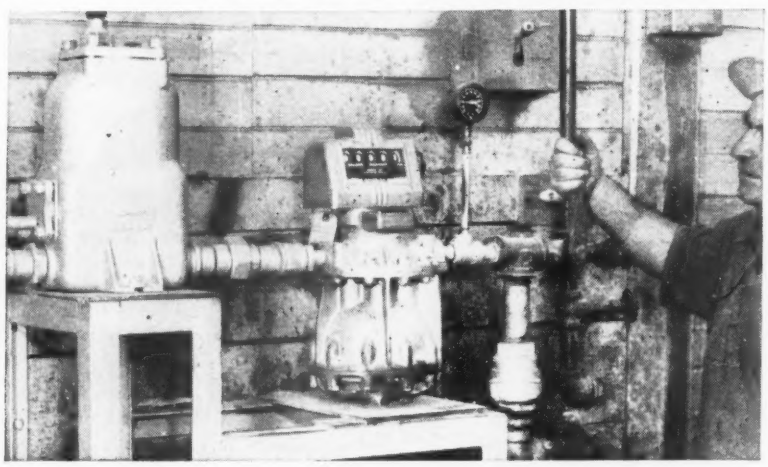

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consists approximately of eight top management men, 90 supervisors, and 1000 lower echelon employees. The foundry produces roughly 3600 Plymouth engine blocks plus other automotive castings in three 8-hour shifts, pouring about 600-625 tons of gray iron in the 24 hours.

Immersion Thermocouple

(*Concluded from page* 193)

time at these high temperatures and the metal composition. Above 1600°C, only about ten readings per tube may be expected.

The immersion thermocouple described here gives accurate pouring temperature control, permanent pouring record and has led to a much more consistent casting practice.

It was designed primarily for checking molten metal temperature in the small indirect arc furnces commonly used in the precision casting industry.

References

1. "Platinum Thermocouple Symposium On Their Contamination," Liquid Steel Temperature Subcommittee, Iron & Steel, May 23, 1943, page 232.
2. "Les Hautes Temperatures et Leurs Utilizations en Chemie," Ed. Libean-Trobe, Paris, 1950.

Publishes Glossary of Labor Contract Terms

A booklet entitled "Glossary of Terms Used in Methods, Time Study and Wage Incentives" has been published by the Society for Advancement of Management to help management and unions avoid varying interpretations of contract language. Each of the 332 terms in the glossary is defined on the basis of its interpretation by the greatest number of experienced people using them.

Ninety-three management leaders of the society, working through its research division, spent four years compiling the definitions. Priced at $1 and published in a vest-pocket format for easy handling, the glossary is No. 104 of a series of publications issued by the Society for Advancement of Management, 411 Fifth Ave., New York 16.

Book Review

The Norton Story, by Mildred McClary Tymeson, cloth, 312 pages 6 x 9½ in., published by Norton Co., Worcester, Mass. Price $3.75.

This account of the 68-year history of Norton Co. is at once an intimate familiar story of the people who built the company to the strong position it holds today and of the company itself and the American economy in which it was developed.

Fluidity Test Reveals

(*Continued from page* 99)

sufficient manganese was present to form manganese sulphide. When the manganese content was below this amount, no loss of fluidity from sulphur was encountered.

The fact that cooling the iron to a low pouring temperature will change sulphur's effect on fluidity is apparently due to a precipitation of manganese sulphide from the iron as it cools. The tendency for excess sulphur to precipitate from the melt can be demonstrated in a number of ways. Table I, for example, shows how the sulphur content of the iron varies with the pouring temperature. The heats shown were all made with the same sulphur addition to the melt. Yet, the sulphur content is lower, the lower the pouring temperature.

It was also found that the high-sulphur heats which were cooled to relatively low temperatures before pouring rejected a slag which upon analysis was found to be high in manganese and sulphur. Thus, there seems to be a natural purging action for sulphur in irons that are high in sulphur and that are cooled to fairly low temperatures before pouring. It is not suggested, however, that low pouring temperatures should be used to combat high sulphur contents, because the lower fluidity resulting from the low temperature would more than offset any improvement resulting from a rejection of excess manganese sulphide. Rather, the high-sulphur irons should be poured at a higher temperature.

Compare Sulphur Effects

The results given in Table I are for an iron having a composition factor of about 4.0. Irons of lower carbon and silicon content also were studied. Thus, Fig. 7 compares the effects of sulphur for irons of average composition factors of 4.0 and 3.57. When the composition factor is lowered, the threshold value (i.e. the sulphur content which first begins to influence fluidity) is lowered, but the rate at which sulphur contents above the threshold value decrease the fluidity is less than at the higher composition factor. A downward change in composition factor influences the action of sulphur on fluidity in a manner similar to a downward change in pouring temperature. This is revealed by the similarity of the curves in Figs. 5 and 7.

The variation in the influence of sulphur on irons of different composition factors is further clarified by a series of heats of varying composi-

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tion and pouring temperature in which the same sulphur addition, 70 grams of iron sulphide in an 8-lb heat, was used in all cases. This addition is equivalent to the maximum addition used in establishing Figs. 5 and 7. Fig. 6 is a plot of the decrease in fluidity vs. the composition factor for pouring temperatures of 2400, 2500, and 2600° F. Two points taken from the previous figure for a pouring temperature of 2800° F also are included. The sulphur content of each test heat is given beside each point on the graph. The following points of interest are evident in Fig. 6:

1. Regardless of pouring temperature, the effect of sulphur appears to decrease to zero at a composition factor of about 2.5.

2. The influence of sulphur on fluidity decreases with a decrease in pouring temperature.

3. For a fixed addition of iron sulphide to the melt, the residual sulphur content tends to decrease as the pouring temperature decreases.

4. For a given pouring temperature, the amount of sulphur remaining in the iron tends to be higher at low composition factors than at high composition factors. This can be established by noting the residual sulphur contents of the heats poured at 2600° F.

5. The curves would all be expected to shift downward for a lower sulphur addition than that used for these tests.

Sulphur thus appears to be somewhat more soluble in irons of low composition factor which may indicate that sulphur pickup would be more of a problem in irons of low composition factor than in irons near a eutectic composition.

Among the common elements found in gray cast iron, sulphur is unique in its effect on fluidity. Further insight into its effect can be obtained if the rate of metal flow in the spiral is measured. If, as seems indicated by the data, sulphur reduces fluidity by precipitating as manganese sulphide in the liquid, this precipitation should reduce the rate of flow as compared with irons of lower sulphur content. This reduced rate of flow then would account for reduced fluidity.

Tests Measure Rates of Flow

Tests were undertaken to measure the rate of flow by rigging fluidity test molds with insulated copper contact wires every 8 inches along the spiral as shown by the photograph of a test casting in Fig. 8. Each contact point was connected through an electrical circuit to a high-speed recorder in such a manner that as the metal proceeded through the spiral, a different potential would energize the recorder circuit each time the metal reached a contact point. Thus, a series of breaks in the recorder curve indicated the time at which the metal reached each point. From these data, rate of flow results were readily calculated.

An illustration of the apparatus assembly is shown in Fig. 9. The mold and circuit board are in the foreground, and the recorder, a potentiometer for measuring metal temperatures, and the furnace are in the background. Results of the tests are plotted in Fig. 10. Because all heats with normal sulphur contents, regardless of composition factor, exhibited the same flow rate only one curve is used to represent these heats. Both gray and white iron compositions were poured for these tests and pouring temperatures ranged from 2400 to 3050° F. The cross marks on this curve correspond to the equation:

$$L = 16t^{0.682}$$ where

L = length of spiral in inches

t = time in seconds

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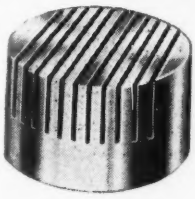

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Wide Slots
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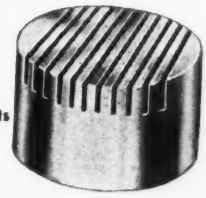
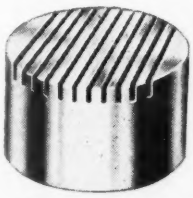
Wide or Narrow Slots
.014 .010





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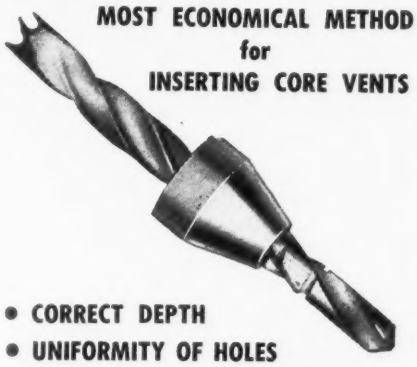

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the sulphur content exceeded normal values, the flow rate curves dropped below that for an iron of normal sulphur content, the extent of the drop depending on the amount of sulphur in the iron. Also, the time spent in flowing is decreased. In other words, the curves become shorter as the sulphur content increases. If only a reduction in flow rate had occurred, the curves should have extended outward about the same amount, but each with a different slope.

The fact that they also become shorter as the sulphur content goes up means that flow was not extended over as long a period of time as in the low-sulphur heats. Since it would not appear that this effect could occur while the metal was completely molten, the data may be interpreted as indicating that the allowable flow time during the initial stages of freezing was reduced by sulphur. This effect then may be looked upon as one which hastens the filling of the flow channel with solid particles so that the remaining liquid can no longer move along the spiral.

As a further check on sulphur, several heats were made in which either the carbon, silicon, or phosphorus contents were abnormally high, and sulphur additions made to these irons. As Table II reveals, these additions resulted in lowered fluidity in the high-carbon and high-phosphorus heats, but not in the high silicon heat. However, the sulphur recovery was very low in the latter case and probably accounts for the lack of any sulphur effect. Since the same sulphur addition was used in every case the results suggest that high silicon tends to limit sulphur pickup. The data in the table also show that with the exception of the high-carbon heat, the actual fluidity of the low-sulphur heats checks the chart values quite closely. The abnormally high fluidity of the high-carbon heat cannot be accounted for.

Graphite Precipitation—Some irons that are poured in very thin sections, such as piston rings, have compositions that definitely place them above the eutectic compositions. In other words, these irons should precipitate a certain amount of graphite from the liquid during cooling. The question arises as to whether this graphite precipitation will affect fluidity in the same way that sulphur affects fluidity and if it does, whether its formation can be suppressed sufficiently by rapid cooling to maintain good fluidity at hypereutectic compositions.

Preliminary test results plotted in Fig. 11 show that the fluidity reaches a maximum at a carbon content of

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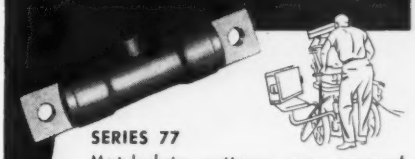

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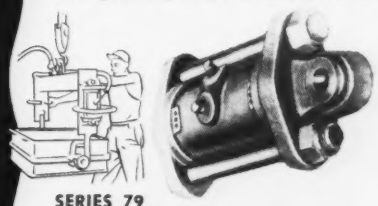

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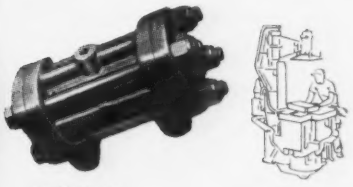

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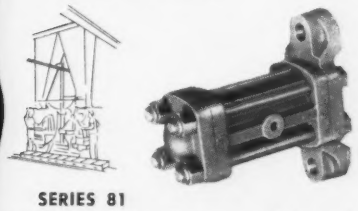

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about 3.47 per cent. With a base silicon and phosphorus content of 2.2 and 0.70 per cent, respectively, this gives a carbon equivalent value of 4.44. The carbon equivalent value, rather than composition factor, is used as a reference because a carbon equivalent of about 4.3 is supposed to represent a eutectic composition. Later work plotted in Fig. 12 shows a value of 4.56 for this point.

It is not certain whether the lack of coincidence between the normally accepted value of 4.3 for the eutectic and the experimentally determined value of 4.56 for maximum fluidity represents a case of supercooling in the alloys beyond a 4.3 value or an incorrect assumption regarding the carbon equivalent value for the eutectic composition. At any rate, when the iron composition exceeds a carbon equivalent value of about 4.56, the fluidity is drastically reduced, apparently because of a separation of kish (graphite) from the molten metal.

The curves in Fig. 12 are for pouring temperatures of 2800, 2600, and 2400° F., and analyses were made of samples from the molten metal and the metal in the well of the fluidity spiral. The lack of agreement in the carbon equivalent obtained by the two methods suggests that the well samples have a higher carbon content in the hypereutectic irons and lower carbon content in the hypoeutectic irons than comparative samples obtained from the molten metal. These differences probably resulted from a segregation effect that occurred in the iron, but the exact reason for the peculiar character of this segregation has not been established.

Since the reductions in fluidity that occurred beyond the eutectic composition are believed to result from the presence of kish in the molten iron, it appeared worthwhile to determine whether or not kish formation could be suppressed by pouring the iron in a casting of smaller cross section than the fluidity spiral, thereby extending the range of good fluidity to still higher carbon values. A test pattern was devised from 5/32-in. rod fastened to a matchplate and properly filletted to enable drawing it from the mold. This pattern is shown in Fig. 14.

Tests Duplicate Results

A number of heats of near-eutectic composition iron were poured into molds made from this pattern. The procedure was to pour one test at 2800° F, and then hold the iron at temperature for 15 minutes to effect a carbon drop before pouring another. Finally, a third test was poured after another 15 minute period had elapsed.

Results are plotted in Fig. 13. Although occasional tests show a high fluidity beyond a carbon equivalent of about 4.60, the trend appeared to duplicate fairly well the results obtained with the regular fluidity spiral. Hence it may be concluded that this change in section size did not alter appreciably the composition at which the fluidity curve reaches a maximum.

The feeling that over-oxidized iron is lower in fluidity than normal gray iron often has been expressed. Therefore, tests were made in which additions of oxygen, added either as mill scale or as a high FeO slag, were made to the molten metal before pouring a fluidity spiral. The tests were made at several temperatures and with and without superheating to 3000° F. In all cases no reductions in fluidity took place. Aluminum was added to some heats to create a reducing condition. Again no noticeable effect on fluidity was encountered.

An investigation of melting atmospheres was also made. The tests paralleled those that had been done by

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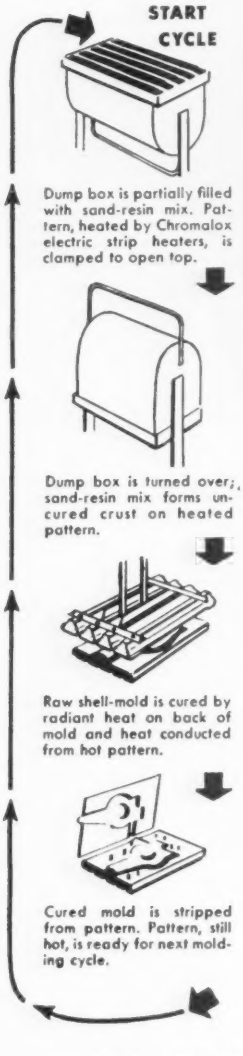
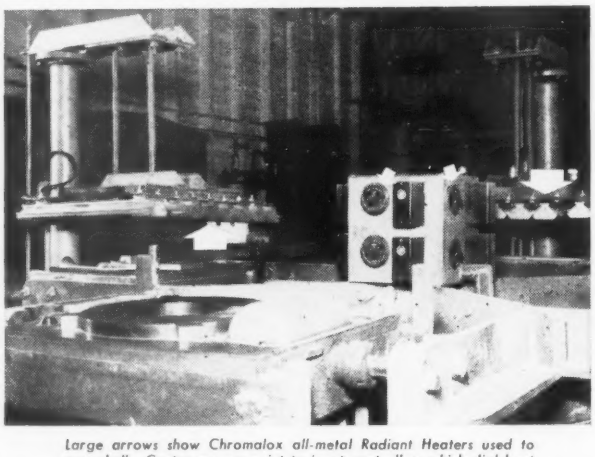

START CYCLE
Dump box is partially filled with sand-resin mix. Pattern, heated by Chromalox electric strip heaters, is clamped to open top.
Dump box is turned over; sand-resin mix forms uncured crust on heated pattern.
Raw shell-mold is cured by radiant heat on back of mold and heat conducted from hot pattern.
Cured mold is stripped from pattern. Pattern, still hot, is ready for next molding cycle.



Large arrows show Chromalox all-metal Radiant Heaters used to cure shells. Center arrows point to input controllers which dial heat intensities for various mold sizes and shapes.

PROBLEM

To provide: 1—an intense heat to cure the sand-resin mix speedily; 2—uniform heat for even curing; 3—a compact, easily installed heat source.

SOLUTION

Chromalox electric strip heaters were attached to the pattern bottom to heat the mold from the pattern side. Chromalox radiant heaters with variable input controllers were installed at the curing stations to heat the mold from the other side.

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Prof. R. W. Heine and E. A. Lange for the Malleable Iron Research Committee of the American Foundrymen's Society on malleable cast iron.[4] Atmospheres tested included nitrogen, carbon monoxide, carbon dioxide, and water vapor. In no instance was there a siginficant difference in fluidity as compared with heats made in air.

Conclusion—It is hoped that the determination of the relationship between pouring temperature, composition, and fluidity as expressed by Fig. 3 makes the fluidity test a more useful foundry tool. Besides developing the chart, the experimental investigation has revealed a number of characteristics of molten cast iron which are of importance in controlling the properties of molten metal.

The fluidity of cast iron appears to be closely related to the freezing process, and fluidity drops off rapidly as the liquidus temperature is approached.

Manganese and sulphur effects can be disregarded unless sulphur exceeds the limits established by the evidence presented in Figs. 5 and 7. It would appear that sulphur in excess of about 0.10 per cent can decrease fluidity at intermediate pouring temperatures in irons that are of slightly hypoeutectic composition. In irons of lower carbon, silicon or phosphorus the effect of sulphur is not so great. Sulphur exerts its effect by cutting down flow rates and allowable flow time.

The fluidity of gray cast iron increases with carbon equivalents up to a value of about 4.55 and drops rapidly beyond this value.

Casting in smaller sections does not appear to change this limit appreciably.

Deliberate oxidation or reduction of gray cast iron through additions to the melt did not affect fluidity to any significant extent. Likewise, variations in the atmosphere over the melt had no effect.

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3. Lew F. Porter and Philip C. Rosenthal, "Effect on Sulfur or Fluidity of Gray Cast Iron," *Transactions*, AFS, 60 (1952) 611.
4. E. A. Lange and R. W. Heine, "Effects of Melting Furnace Atmosphere on Fluidity, Hot Tearing Tendency, and Other Properties of Malleable Iron," *Transactions*, AFS, 60 (1952) 169.

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Art Pattern Works Inc. has been formed in Milwaukee with a capital stock of 100 shares of no-par value. Incorporation papers were signed by Victor Lamke, registered agent, 1305 North Fourth St., Milwaukee.

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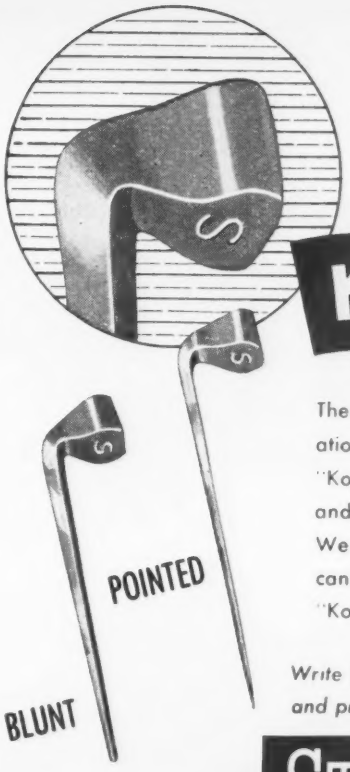

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The sign, S-G, on aluminum ingot means aluminum of uniform quality made to meet the most rigid chemical and physical specifications. Whether it's for permanent mold, sand or die casf you can be sure with S-G ingot.

Our complete modern research and testing laboratories are available to help you secure just the right ingot to meet your needs.

BRASS AND BRONZE INGOT ALSO PRODUCED TO YOUR SPECIFICATIONS

SONKEN-GALAMBA Corporation

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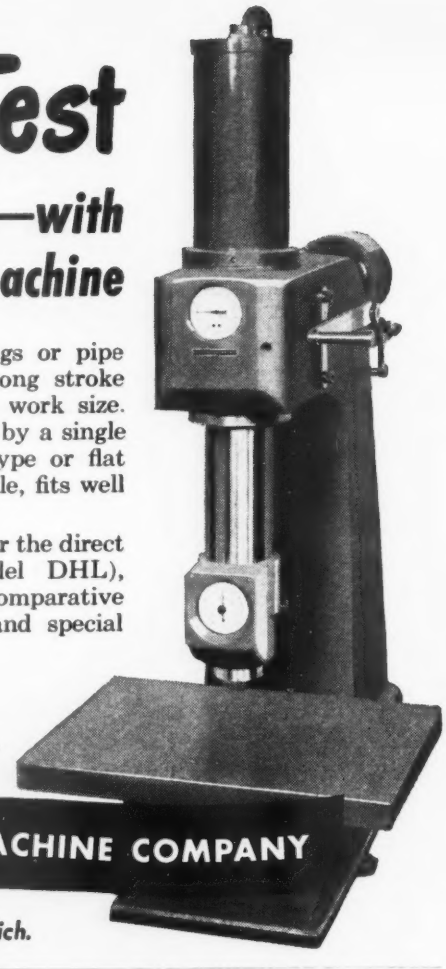
Brinell Test

large pieces fast—with this long stroke machine

Large awkward castings, forgings or pipe are easily tested because the long stroke eliminates screw adjustment to work size. The hydraulic ram is controlled by a single lever. Large, stationary roller-type or flat table makes work handling simple, fits well into a conveyor line.

Choice of plain Brinell machine or the direct reading machine (shown, model DHL), where dial at end of ram gives comparative hardness immediately. Larger and special machines may also be had.



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DETROIT TESTING MACHINE COMPANY

9382 Grinnell Ave., Detroit 13, Mich.

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End Dump TRAILER TRUCK
CONSULT
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FOR THE BEST
Materials HANDLING EQUIPMENT
Item B-746
CORRUGATED BOX with legs
Item C-609
SKIP TOTE BOX
Item B-391
MULTI-PURPOSE CART
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CORE RACK
For foundry use. Has corner posts designed for adjustability to hold horizontal sections at desired height. Sections notched for 1" pipe extending length of rack to hold core plates. When inquiring, specify dimensions required, including underclearance and quantity.
Automatic END DUMP
Ideal for handling and dumping of sand, scrap, castings, stampings and other heavy materials. Locks during loading by safety catch. Built for lift or fork truck or with casters. All welded construction. Standard size ½, 1 and 1½ yds. capacity, other sizes on request.
When Ordering—Always give "item" number. All prices are f. o. b. Detroit. Prices are subject to change without notice. Write for Catalog.
Item 50975
AIR SAVER leak proof AIR VALVE
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Industrial DUST PAN
DESIGNED AND MANUFACTURED BY
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16033 FULLERTON AVE., DETROIT 27, MICH.

TRADE PUBLICATIONS

For More Details Use Reply Card—Page 217

AUTOMATIC MOLDING: SPO, Inc., 6449 Grand Division Ave., Cleveland 25—Bulletin MM describes an automatic molding unit for fully automatic mass production of uniform standard molds. The bulletin contains a two-page photograph of the unit as well as a schematic drawing of a typical installation.
For More Details Circle No. 91—Page 217

FLOOR PATCHING: Master Builders Co., 7016 Euclid Ave., Cleveland 3—Bulletin describes advantages of an iron-asphalt patching material for worn concrete floors that is said to permit fast, easy patching or resurfacing that will not break down, even at feather edges. Contains 75 per cent metallic aggregate.
For More Details Circle No. 92—Page 217

COUPLINGS: Flexoid Coupling Co., Division of Smith Power Transmission Co., 1545 East 23rd St., Cleveland 14 — Publications FSB-401 and FSB-402 discuss the construction, advantages and function of drive shaft couplings made with rubber bushings that eliminate noise, lubrication and mechanical lost motion.
For More Details Circle No. 93—Page 217

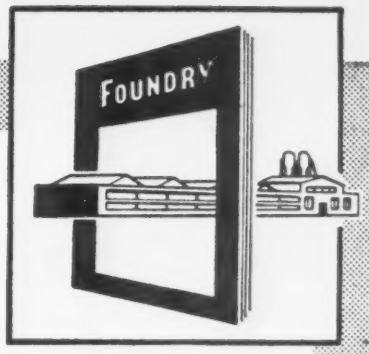
TESTING MACHINES: Tinius Olsen Testing Machine Co., 1166 Easton Rd., Willow Grove, Pa.—Bulletin 47 gives complete information on two complete lines of universal testing machines, including a description of an electronic system which provides a 50 to 1 spread of testing ranges and permits changing of ranges during test with the flip of a switch.
For More Details Circle No. 94—Page 217

PORTABLE CONVEYOR: Trowbridge Conveyor Co., 850 Van Houten Ave., Clifton, N. J. — Catalog 252 offers an illustrated description of a new portable conveyor which is primarily a light and medium duty unit for handling weights up to approximately 500 lb.
For More Details Circle No. 95—Page 217

WIRING CONDUIT: American Brass Co., American Metal Hose Branch, 692 Main St., Waterbury, Conn. — Bulletin UA-530 describes flexible, liquid-tight, electrical wiring conduit for use in wet locations. Suggested applications and specifications are included.
For More Details Circle No. 96—Page 217

CONTAINERS: Pittsburgh Steel Co., Grant Bldg., Pittsburgh 19—Brochure illustrates and discusses wire mesh materials handling boxes and pallets. It shows specific uses in various industries and cites case histories.
For More Details Circle No. 97—Page 217

NONFERROUS CASTING: Wellman Bronze & Aluminum Co., 12800 Shaker Blvd., Cleveland 20—Catalog 53 discusses and illustrates the firm's production facilities for aluminum, magnesium and bronze alloy castings



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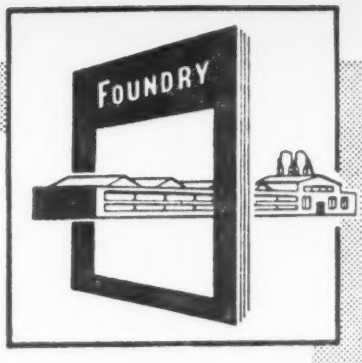
8-53



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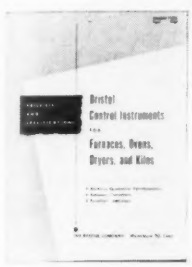
in sand, semipermanent and permanent molds. Metallurgical tables on the characteristics of each alloy and data pertaining to typical castings and to general laboratory and quality control operations are included.
For More Details Circle No. 98—Page 217

ELECTRODES: Alloy Rods Co., York, Pa.—Bulletin AR53-16 on the company's complete line of stainless steel electrodes contains explanations of the two basic types offered, individual descriptions of the 23 regular and special analyses and data on weld metal properties, welding procedures, electrode analysis and color charts, current ranges and AISI type numbers.
For More Details Circle No. 99—Page 217

CONTROL INSTRUMENTS: Bristol Co., Waterbury 20, Conn.—Catalog P1255 features electronic potentiometer and millivoltmeter type pyrometer controllers, recorders and indicators for all types of fuel-fired and electric heating equipment, including furnaces, ovens, dryers and kilns. Complete engineering specifications and prices are given. Illustrations include photographs, diagrams of various control arrangements and dimension sketches.



For More Details Circle No. 100—Page 217

CIRCUIT BREAKERS: Westinghouse Electric Corp., Box 2099, Pittsburgh 30—Booklet B-5456 discusses the application of circuit breakers to reduce downtime and maintenance. Actual case histories show the economies effected by their use. Complete design and operating features are presented, and typical applications for seven types of enclosures are given.
For More Details Circle No. 101—Page 217

PROTECTIVE SLEEVES: A & A Mfg. Co., 2017 West Clybourn St., Milwaukee 3—Bulletin BA-1 illustrates contiguous applications for accordion, telescopic sleeves and boots. Engineering features and advantages of the equipment are covered in bulletin AH-2.
For More Details Circle No. 102—Page 217

INDUSTRIAL CONSTRUCTION: Ferber Co., 16 Johnson Ave., Hackensack, N. J.—Brochure describes the organization's system of using standardized units and components that can be assembled in any numerical combination or pattern to form an industrial structure.
For More Details Circle No. 103—Page 217

DUST COLLECTION: American Wheelabrator & Equipment Corp., 1102 South Byrkit St., Mishawaka, Ind.—Bulletin 402 presents case histories which show how cloth-tube collectors filter gases from such

All sizes graded to S.A.E. specifications

"Certified" Abrasives
clean more castings per dollar!

"Certified" Samson Shot and Angular Grit are made *extra-tough* by a special *automatically controlled* hardening process. They wear longer, can be used over and over again . . . actually clean more castings per dollar! Save money . . . switch to "Certified" Abrasives.

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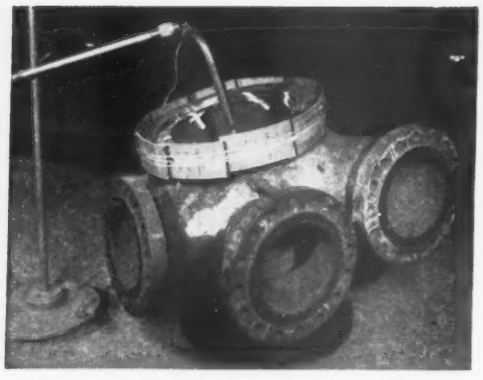

Radiographing a flange on a heavy steel casting.

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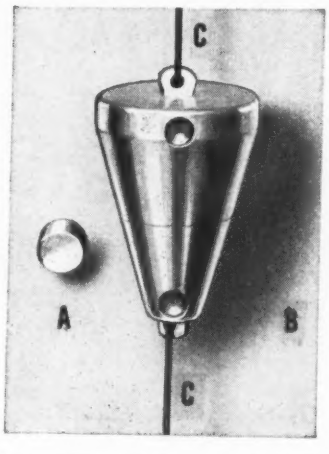
The use of gamma rays in radiographing steel castings has greatly increased since 1930, when the first commercial use of radiography was introduced. Radium radiography is simple, economical and effective; because it may be rented or leased, the equipment doesn't require a capital investment. It is simple to operate because it doesn't require especially skilled operators. Today radium radiography is rapidly approaching the status of standard equipment in progressive steel foundries. Let us tell you more about the simplicity and economy of radium radiography. Write today for prices, terms and case histories. Your requirements promptly supplied.

RADIUM CHEMICAL CO., INC.

161 East 42nd St., N. Y. Chicago: Marshall Field Annex Bldg. Los Angeles: 3723 Wilshire Blvd.



The apparatus is as simple as
A—small radium capsule
B—cartridge container
C—rigid string support

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This is not just a tricky catch phrase. It's what you get when you use Semet-Solvay Foundry Coke in your cupolas.

What is "better melting"? It's melting your iron *hotter, faster, cleaner.*

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for Better Melting

equipment as lead blast furnaces, sintering machines and cupolas melting slag. Other applications covered include dust control in dross sampling, coal cleaning and asbestos processing.

For More Details Circle No. 104—Page 217

POWER CONVERSION UNITS: General Electric Co., Schenectady 5, N. Y.—Bulletin GEA-5658B, on the complete line of metallic rectifier power conversion units manufactured by the company, lists design features, advantages, descriptions, performance, circuits, dimensions and ratings for all units. A guide also is provided as an aid in the preparation of contract specifications.

For More Details Circle No. 105—Page 217

MONORAIL HANDLING: American MonoRail Co., 13104 Athens Ave., Cleveland 7—The company has added eight new studies to its "Case Study File of Engineered Applications" of monorail handling equipment. The new group includes studies of automation, distribution, integration of operations and other aspects of handling.

For More Details Circle No. 106—Page 217

STARTERS: Allis-Chalmers Mfg. Co., 1032 South 70th St., Milwaukee—Bulletin 14B7733 contains advice on selecting the right starter for squirrel-cage induction motors rated up to 600 hp at 600 v or less. An explanation of two or three-wire control and hints on selection of starter elements for overload relays also are given.

For More Details Circle No. 107—Page 217

SALT TABLETS: Mine Safety Appliances Co., Braddock, Thomas & Meade Sts., Pittsburgh 8—Bulletin 0408-3 describes permanent and throw-away salt tablet dispensers and such types of tablets as plain salt, salt-and-dextrose, enteric-coated for delayed dissolving and impregnated for slow dissolving.

For More Details Circle No. 108—Page 217

ALUMINUM MATCHPLATES: Accurate Match Plate Co., 1847 West Carroll Ave., Chicago 12—Booklet is designed to acquaint readers with the variety of aluminum production pattern equipment that now is being pro-

"I have a very strong suspicion that someone has been sleeping in the sand again!"

duced by pressure casting aluminum into plaster molds, to familiarize them with the type of pattern equipment necessary for the process and to supply a basis for estimating the costs of the various items.
For More Details Circle No. 109—Page 217

IMPREGNATION: Steel Cast Co., 2113-15 East York St., Philadelphia 25—Available for distribution to design, production and quality control engineers who have a problem with porosity in castings designed to hold gas or liquid under pressure, report F-3 compares custom impregnation with a plant installation and analyzes costs, amortization of equipment and results.
For More Details Circle No. 110—Page 217

MATERIALS HANDLING: Union Metal Mfg. Co., Dept. PR, Canton, O.—Booklet shows such units in a materials handling system as bin boxes, gravity-fed hoppers, multi-duty boxes and trays, end loading scoops and others. On-the-job photographs and picture stories describe the equipment and its uses.
For More Details Circle No. 111—Page 217

ALLOYING ELEMENTS: Permold Co., Medina, O.—Illustrated brochure explains how 16 alloying elements of aluminum are measured quantitatively and qualitatively by electronic spectograph and points out the importance of rare alloying elements in determining quality of aluminum permanent mold and sand castings.
For More Details Circle No. 112—Page 217

RADIO CONTROL: Barrett-Cravens Co., 4663 South Western Blvd., Chicago 9—Bulletin 534 is devoted to descriptions and illustrations of the company's radio remote control industrial tractor for trackless train operation. Several pages are devoted to other items in the firm's line of materials handling equipment.
For More Details Circle No. 113—Page 217

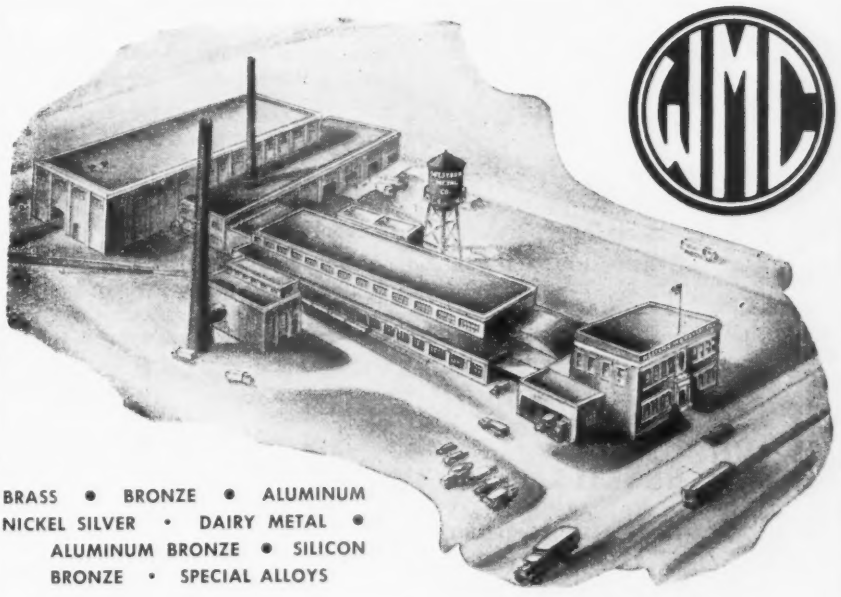
VACUUM MELTING: Vacuum Metals Corp., 70 Memorial Drive, Cambridge 42, Mass.—Company offers reprints of a magazine article called "Vacuum Melting Lengthens Fatigue Life, Improves Impact Properties." Author is James H. Moore, director, metallurgical department, National Research Corp., Cambridge.
For More Details Circle No. 114—Page 217

PUMPS AND COMPRESSORS: Pennsylvania Pump & Compressor Co., Easton, Pa.—Catalog 546 concerns air and gas compressors, dry vacuum pumps, aftercoolers, valves and centrifugal pumps for boiler feeding, general power plant and in-industrial applications.
For More Details Circle No. 115—Page 217

ELECTRODES: Air Reduction Sales Co., 60 East 42nd St., New York 17—Catalog 1318 covers over 30 different electrodes, including stainless, mild and high tensile steels, cast iron, nonferrous, low hydrogen and hardfacing, all of which are described as to chemical analysis, welding procedures and applications. Other sections concern electrode se-

Quality

INGOT METALS



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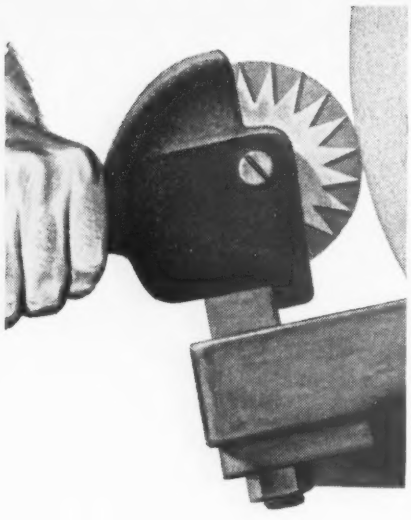
WESTERN METAL COMPANY have built their reputation on quality and service.
By using WEMCO SPECIAL DELIVERY SERVICE it is not necessary to carry large inventories for we carry complete stocks of all standard Brass, Bronze and Aluminum Alloys.

We provide complete laboratory service as well as experienced field metallurgists to help you produce the quality castings necessary to insure the high standards of today's requirements.

It will pay you to check with WESTERN.

WESTERN METAL COMPANY
3201 SOUTH KEDZIE AVE. CHICAGO 23, ILLINOIS

SMELTERS AND REFINERS OF BRASS AND ALUMINUM INGOTS



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PER HOUR

Grinding wheels dressed with the right dresser, type and size, enable you to speed up your grinding per hour — save production costs.

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You'll get maximum service from grinding wheels that are dressed with the correct type and size of Desmond Dresser. Ask your DESMOND DISTRIBUTOR for a copy of the Desmond Dresser Guide Chart. This guide and the technical information the Industrial Distributor furnishes you will improve the efficiency of your grinding operation.

THE DESMOND-STEPHAN MFG., CO.

URBANA, OHIO

Desmond

DRESSERS & CUTTERS

lection, mechanical properties and testing of electrodes and AWS-ASTM specifications.
For More Details Circle No. 116—Page 217

MEEHANITE CASTINGS: American Brake Shoe Co., 230 Park Ave., New York 17—Booklet on Meehanite castings produced by the company for industry relates characteristics of the material, lists properties and carries engineering information on hardenability, section strength and comparative properties of other cast metals.
For More Details Circle No. 117—Page 217

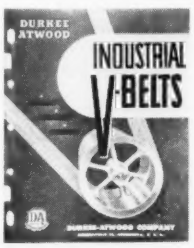
CHECK LIST: Fischer & Associates, 5209 Euclid Ave., Cleveland 3—"Profact Foundry Check List," provides ferrous and nonferrous foundrymen with a quick analysis of the efficiency of his foundry operations and points out possible weak spots in production equipment and methods.
For More Details Circle No. 118—Page 217

CAR PULLER: Whiting Corp., Harvey, Ill.—Bulletin T-109 reports on the service record of the firm's car puller for either road or track operation and lists its money and labor saving advantages as a freight car handler.
For More Details Circle No. 119—Page 217

MATERIAL HANDLING: Wheeler Associates Inc., 15017 Detroit Ave., Cleveland 7—June issue of the company's publication *Industry Ideas* contains cost-cutting ideas on material handling and a check list to aid foundrymen in evaluating their own handling system.
For More Details Circle No. 120—Page 217

BLOWERS: Eclipse Fuel Engineering Co., Rockford, Ill.—Catalog K-100 describes various types of centrifugal pressure blowers and their construction features and lists dimensions, specifications and applications.
For More Details Circle No. 121—Page 217

V-BELTS: Durkee - Atwood Co., Dept. 411, Minneapolis 13—Engineering catalog on industrial V-belts and their applications contains the new horsepower ratings approved by the Rubber Maintenance Association. It is a technical publication specifically prepared for design engineers, maintenance engineers and selected purchasing personnel as a V-belt power transmission guide.



For More Details Circle No. 122—Page 217

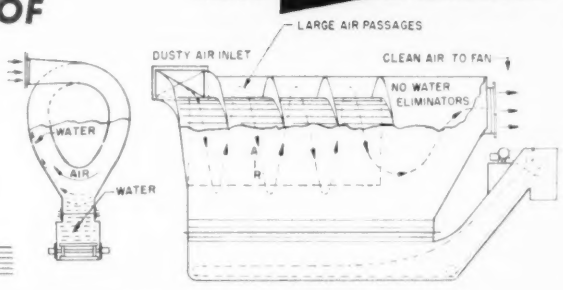
BUCKET ELEVATORS: Jeffrey Mfg. Co., Columbus 16, O.—Catalog 850 consists of illustrations, diagrams and specifications of various types of bucket elevators and accessories.
For More Details Circle No. 123—Page 217

THE MASTER OF

DUST

IN INDUSTRY

Air Tumbler



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P. O. Box 67 Lake Orion, Michigan

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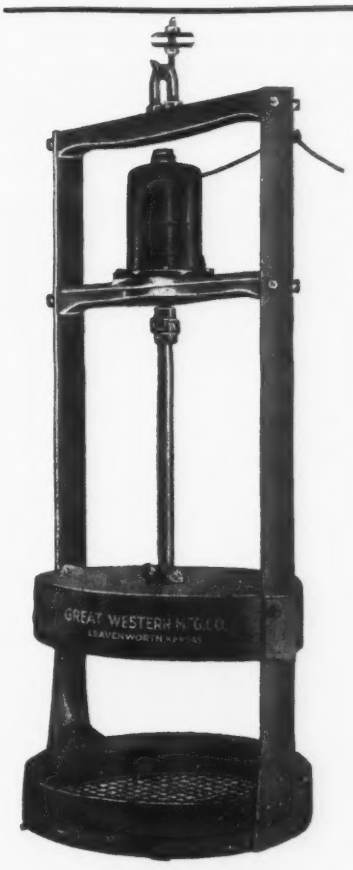
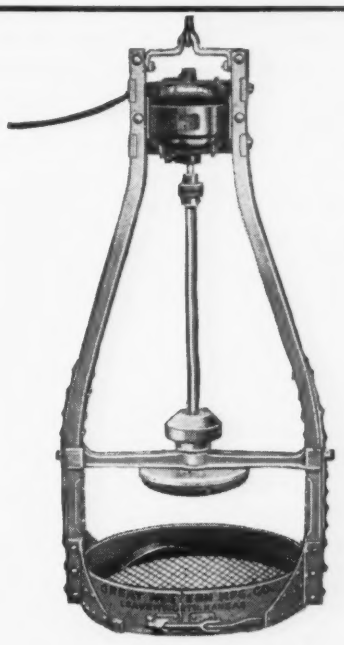


Type "CR" with 24" sieve $310.00



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With 20" sieve $250.00
Also made with 36" sieve $450.00

All these machines cost less than 1¢ an hour for power. Quickly removable steel rim sieves can be removed, emptied and replaced in seconds. Saves up to 97% of your labor costs. Send for free descriptive folder.

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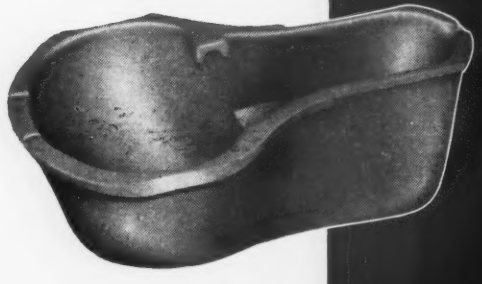

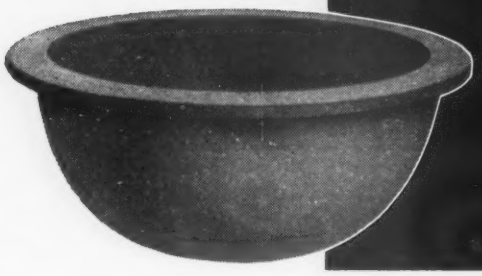

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AMERICAN

PORTABLE

Slag Disposal Unit

Eliminates The Most Undesirable Job In Foundry

Saves hours of manpower . . . pays for itself in few months of operation. Hot Slag drops into quenching tank, which is supplied with circulating water. Granulated Slag is discharged into cart, truck, or our conveyor system. Eliminates dangerous manual handling of hot slag.

Well engineered and trouble free . . . requires very little maintenance. Can be moved between cupolas.

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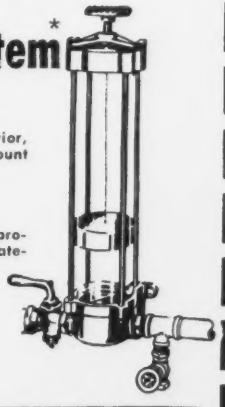
REDUCE OPERATING COSTS
with
AQUADYNE
Wet Water system*



• FOR CORE SAND MIXTURES

AQUADYNE Wet Water produces a vastly superior, smoothly blended sand mix and reduces amount of core oil needed.

• FOR MOULDING OPERATIONS

AQUADYNE Wet Water spreads, diffuses and produces a faster penetration with moulding materials—resulting in sharper, cleaner castings and fewer rejections.

• FOR SAND CONDITIONING

Sand mixing is simpler, faster and more efficient. The Aquadyne System saves water, as well as time because its unusual low surface tension gives instantaneous coverage of each grain of sand it touches.

The HYDROBLENDER

• FOR DUST CONTROL

There's nothing better than AQUADYNE.

Write for our free booklets, "The Theory of Wet Water" or "Controlling Dust in Industrial Plants"

**Any ordinary water supply can be hooked up to our specially designed Hydroblender as required with the Aquadyne multiphase wetting compound capsule. Each capsule gives 1,000 gallons or more of wet water for less than ½ cent a gallon*

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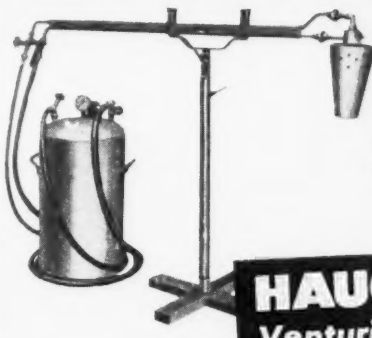

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- 5 times as fast as wood or charcoal.
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- Burns fuel oil, kerosene, etc.
- Clean, powerful, instantly adjustable for drying or heating.
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- Single and double burners operating from one fuel tank.

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HAUCK MANUFACTURING CO.
Oil and Gas Burners for Core Ovens, Annealing Furnaces, Heating and Drying
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A Typical U. S. Electrical Tool Value

If you use ¼-inch drills *compare this U. S. Product, feature by feature,* and then *compare the price.*

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Here is the ideal drill for continuous duty on even the most difficult jobs in automotive, maintenance and assembly work. Extremely powerful, it will not stall in heavy-duty drilling in metal or wood. Cool operating under constant use.

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United States Electrical Tool Division
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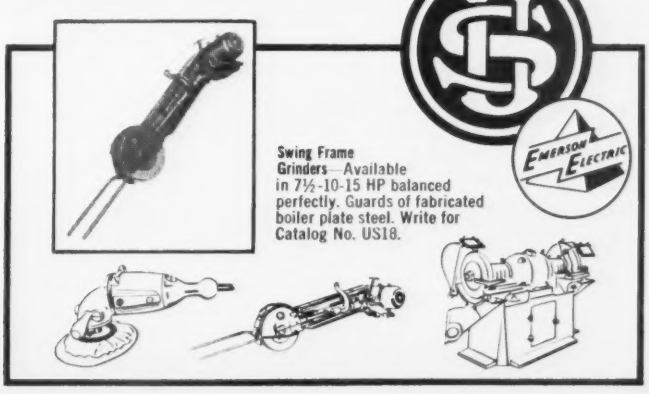
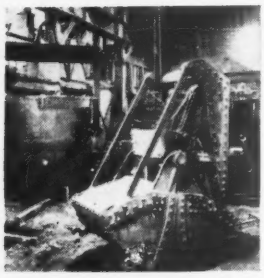

EMERSON ELECTRIC
Swing Frame Grinders—Available in 7½-10-15 HP balanced perfectly. Guards of fabricated boiler plate steel. Write for Catalog No. US18.

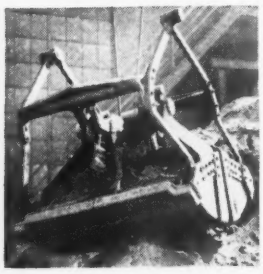
These Four BLAW-KNOX *Buckets*
Help Solve Your Rehandling Problems for Average or Unusual Conditions

FOR AVERAGE HEADROOM



THERE is a type and size of Blaw-Knox Single-Line Hook-On Foundry Buckets to meet a wide range of operating conditions. Blaw-Knox can best give you the competent engineering service that makes possible selection of the bucket suited to your needs.

FOR EXTREMELY LOW HEADROOM

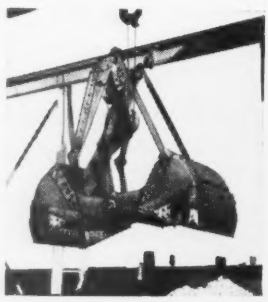


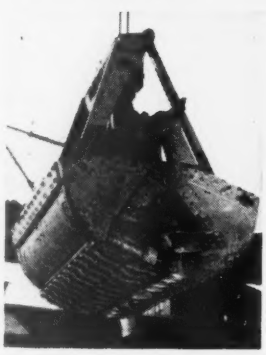
THIS Single-Line Hook-On Bucket solves rehandling problems when headroom is extremely limited. The 3/4 yd. capacity bucket requires only 6'7" operating headroom. Also available in larger sizes.

FOR COKE AND SAND
"Shark Tooth" Single-Line Hook-On Buckets

HERE'S the answer to the problem of handling coke and sand . . . simply by adding or removing liner plates, the *same* dual purpose Blaw-Knox Bucket handles both, with minimum degradation of coke and without sand leakage! The illustration at the upper right shows an open head type Single-Line Hook-On Bucket, rated 1 cubic yard, with liner plates applied inside of the shark teeth for handling sand, coal, small limestone and granular fines. Illustrated at the right is a closed head type 1 cubic yard Shark Tooth Bucket without liner plates for coke handling.

Blaw-Knox Shark Tooth Buckets are available in a wide range of sizes and for different headroom conditions.





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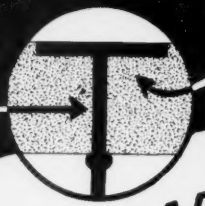
SAND PACKS BETTER

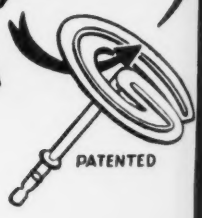
AROUND STEM

UNDER HEAD



OPEN HEAD Shoulder Radiator CHAPLET holds cores rigidly

REDUCES CASTING REJECTS



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DANDUX has the answer!

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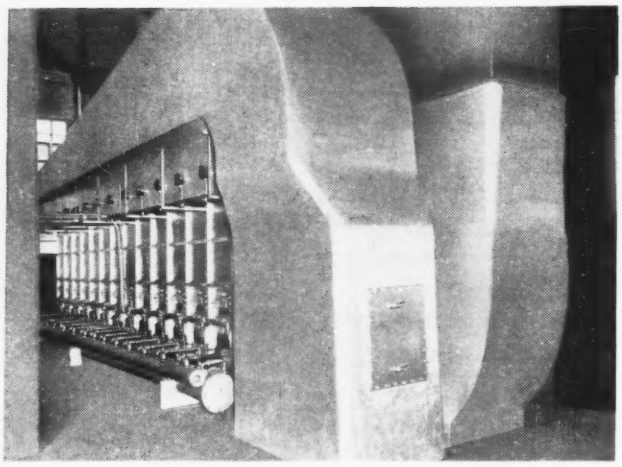

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Heating System

For leading foundries throughout the industry this modern ROSS System is not only greatly increasing tonnage but producing savings big enough to pay for its entire cost in a surprisingly short time. It operates with present blowers and can be installed without any interference with melting schedule. Simple, effective, economical.

ROSS also supplies a complete line of Core and Heat Treat Ovens covering range up to 1000° F.

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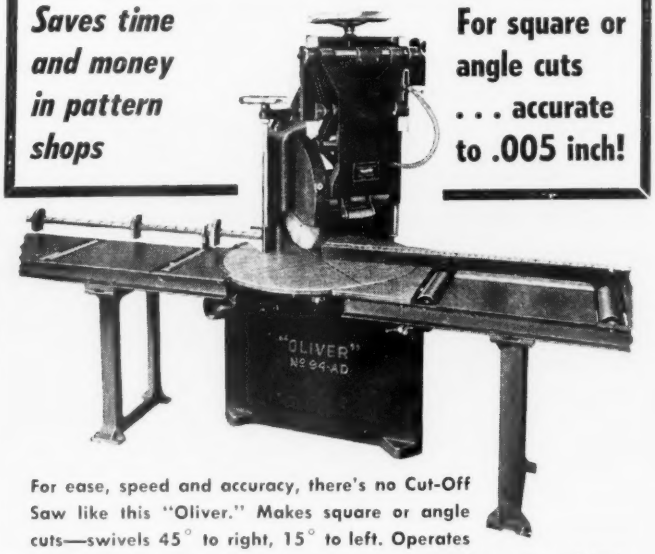
"OLIVER"
Straightline Cut-Off Saw

Saves time and money in pattern shops

For square or angle cuts . . . accurate to .005 inch!



For ease, speed and accuracy, there's no Cut-Off Saw like this "Oliver." Makes square or angle cuts—swivels 45° to right, 15° to left. Operates with a light touch—no springs or counterweights. An 18-inch saw cuts stock 4½" thick. Cuts stock 2" x 20" with ease. Saw table has automatic cut-off gauge and ball bearing steel rollers. *Write for Bulletin 94-AD.*

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HARD CHROMED • PORTABLE PNEUMATIC TOOLS

DO MORE WORK AT LESS COST
because they deliver more power per cubic foot of air consumed, are light in weight for easier maneuverability and they retain their new tool power longer.

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because they are lighter in weight, better balanced and designed to reduce shock and be free from vibration.

IF YOUR PROBLEM INCLUDES
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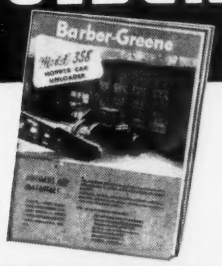

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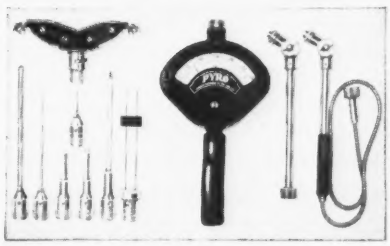

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Manufacturers of Pyro Optical, Radiation Immersion and Surface Pyrometers for over 25 years.

SMOOTHER CORES

DRYING TIME IS CUT

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LARGEST SELLER IN THE FIELD!

Kordek, the preferred dry bond for cores...

Full technical service, without obligation, is available to show how you can profit from the use of MOGUL® Cereal Binder in your production.

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NO SCOOPING

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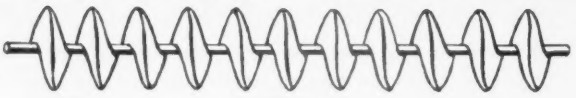
NO TIEING

CUT BAG PACKING COSTS

AUGER-MATIC



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Quickly fills self-closing bags to the desired weight. Saves time in filling and eliminates need for sewing or other expensive bag closing equipment.

The AUGER-MATIC Bag Packer has a multi-twist auger which can quickly be changed to pack any material from powder to pellets.

AUGER-MATIC Packing reduces dirt and waste . . . a time and labor saver. Packer can easily be moved from one filling point to another.

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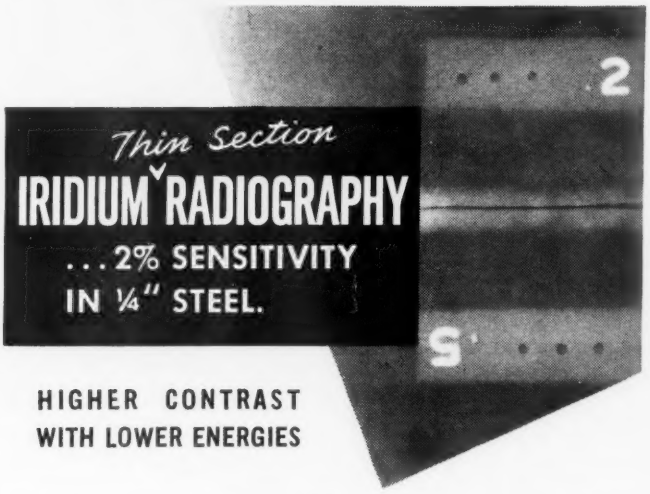

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Iridium sources provide 2% definition in steel from about ¼" to approximately 1"; excellent results in aluminum and magnesium. Average gamma energy about 450 KEV. Active source 2mm x 2mm, sealed in aluminum capsule attached to steel head for handling with remote magnetic handler. Standard source strength, 1.25 curies; other strengths on special order. Regular irradiations scheduled every two months.

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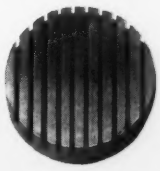
TYPE D
BRASS SLOTTED VENT — Head thickness .12", slot widths .010", .013", and .015". Use in curved core box surfaces.

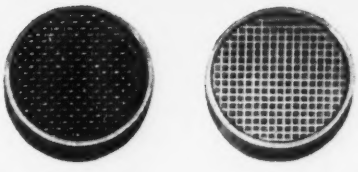
TYPE C
STEEL SLOTTED VENT — Thin head, chrome plated, use in flat surfaces of core boxes. Slot widths .010", .013" and .015".



DEMMLER

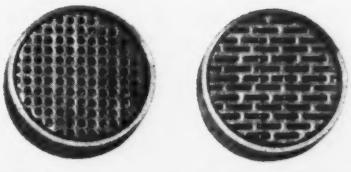
PRECISION CORE BOX VENTS

TYPE H
SCREEN VENT — Brass body with stainless steel wire mesh. Standard meshes No. 30, No. 40 and No. 50 available.



TYPE L
LECTROMESH VENT — Brass vent, head made of .010" thick Lectromesh sheet, with .022" square holes.

TYPE A
PERFORATED VENTS — Head of brass perforated sheet, .016" thick. Hole sizes: No. 00 (.020" dia.), No. 0 (.024" dia.) No. 1 (.027" dia.), No. 2 (.033" dia.)



TYPE B
PERFORATED VENTS — Staggered slots, .020" x .115", brass vent with head of brass perforated sheet.

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WM. DEMMLER & BROS.

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ILLINOIS

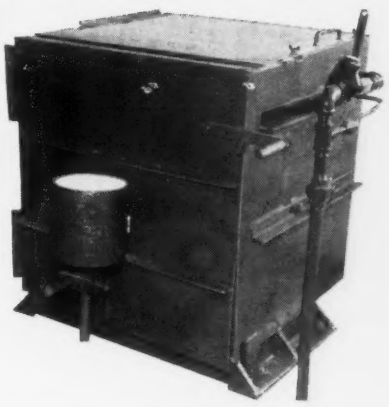
CENTRIFUGALLY CAST

AUTOMOBILE CYLINDER LINERS

DIESEL ENGINE LINERS

BRONZE BUSHINGS

on the new
WATER-COOLED
Model M-WC
(Illustrated)



Utilizes low cost permanent molds of available steel tubing to produce gray machinable cast iron or bronze bushings.

Water cooled molds can be maintained at either high or low temperature easily. High or limited production in very small space with unskilled labor. Completely safe for workmen. Simple, sturdy equipment. Quick changeover from one mold to another. Practically 100% metal yield of high quality, denser castings. Metal porosity eliminated.

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For some "HOT NEWS" on these new heaters write to.....

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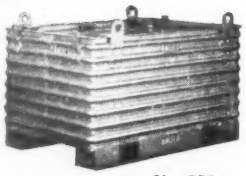
Here's why

rugged BRUSCO handling equipment increases efficiency

BRUSCO CORRUGATED STEEL BOXES



No. 558

Save floor space — stack safely from floor to roof. Four way entry for fast, efficient handling. Equipped with crane lugs for movement by crane. Fabricated from heavy gauge corrugated steel to give added rigidity and maximum strength. Thoroughly and securely arc welded for longer, maintenance free life. Made in various sizes and load capacities to suit your requirements.

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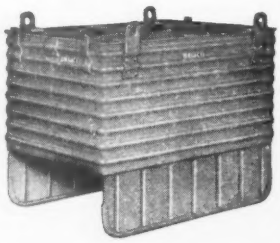
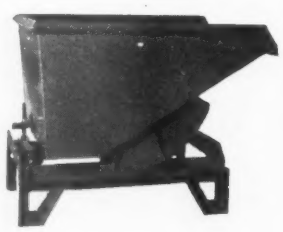


Saves valuable floor space and speeds production. Made in all sizes and various gauges of steel to fit any load capacity. Stack from floor to roof.

No. 1210 BRUSCO SELF DUMPING HOPPER



Speeds production and saves labor in handling your parts and materials. This hopper is fabricated of heavy steel plate thoroughly reinforced. Made in ½, 1, 1½ and 2 cubic yard capacities. Underclearance is optional.

Write today for new Bulletin No. 500 presenting the most complete line of Part Boxes and Brusco Self Dumping Hoppers on the market.

Brusco HANDLING EQUIPMENT

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Cut, Straightened and Packaged

TO YOUR SPECIFICATION

VIKING STEEL can furnish soft black annealed wire 5 ga. thru 16 ga. in straightened and cut lengths, individually bundled by weight or pieces.

In addition to the above, *VIKING* regularly stocks the following hot rolled foundry requirements:

- Soft black annealed wire in coils
- Hot rolled rounds in coils 1/4", 5/16", and 3/8" diameter
- Hot rolled rounds—straight lengths 1/4" diameter thru 2" diameter
- Tapping bars 1/2" diameter thru 2½" dia.
- Alloy abrasion-resistant wear plates
- Wire rope—choker slings.

VIKING STEEL COMPANY

16700 St. Clair Avenue

CLEVELAND 10, OHIO

PRODUCERS CORE SAND CORPORATION

PITS AT MICHIGAN CITY, INDIANA AND SAWYER, MICHIGAN

MICHIGAN CITY, INDIANA

TUMBLING BARRELS

Roller Bearing throughout

Direct Motor Drive with Speed Reducer

V Belt Motor Drive—Tight & Loose Pulley Drive

ROYERSFORD FOUNDRY & MACHINE CO.

BOX F

ROYERSFORD, PA.

Tamms

AMORPHOUS

CRYSTALLINE

DIATOMACEOUS

SPECIAL SILICAS

SIZE RANGE FROM 100 MESH TO 600 MESH

WRITE FOR PRICES AND SAMPLES—

- All grades of silica ideal for precision casting by the investment molding process
- Will meet the exacting requirements of most precision casting work
- Precision quality to assure uniform casting performance

FINE • PURE • WHITE • UNIFORM

TAMMS INDUSTRIES, INC. Dept. RM-12 228 N. La Salle St. Chicago 1, Ill.

GEO. N. WILEMAN

CONSULTING ENGINEERS
TO THE FOUNDRY INDUSTRY

•

Plant and Equipment

Reports — Design — Layout
Supervision of Construction
Complete Engineering Service.

•

COMMERCIAL TRUST BLDG.
PHILADELPHIA 2, PA.

SHORT CUT TO PROFITS

ohio MAGNETS

WELDED AND BOLTED TYPES • ALL SIZES • COMPLETE CONTROL EQUIPMENT • 26 YEARS A LEADER IN MAGNETIC MATERIALS HANDLING.

THE OHIO ELECTRIC MFG. CO. • 5900 MAURICE AVE. • CLEVELAND 4, O.
Associate Member Institute of Scrap Iron and Steel, Inc.
A-2757

EMPIRE

"THAT GOOD" FOUNDRY COKE

DEBARDELEBEN COAL CORPORATION
2201 First Ave., North • Birmingham 3, Ala.
Phone 3-9135

PP INC.

What's Your Scrap Loss?

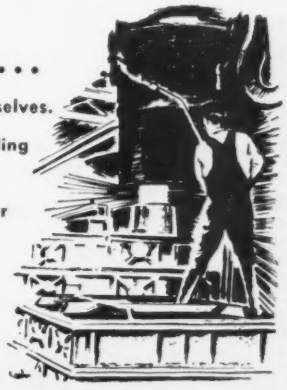
A *few cents* invested in genuine Porcelain Products Ceramic Strainer Cores *can save you dollars in production costs!*

With PP INC. Ceramic Strainer Cores in the gates, you'll turn out *improved* castings free from slag . . . *cleaner* castings that mean *fewer rejects* and *less time* in the cleaning room. In short, *higher quality* castings for your customer . . . *and at no extra cost,* because the additional foundry profits realized from increased production, fewer rejects and lower cleaning costs will more than pay for PP INC. Ceramic Strainer Cores used.

May we send samples and complete information?

Look at these Advantages . . .

- Economical to use . . . pay for themselves.
- Substantially reduce chipping, welding and grinding.
- Dependable . . . won't fracture under molten heat.
- Available in sizes to cover a wide range of requirements.
- Packed for safe, easy handling.



Porcelain Products, Inc.
FINDLAY, OHIO

Leco

CUSTOM and REPAIR GLASS BLOWING

Do you have expensive glass parts, burets, stopcocks and other items that are not being used because they are broken or cracked? Pack them up now and send them to the LECO GLASS BLOWING SERVICE for repair or part replacement. The cost is small compared with the price of a complete unit. We suggest you tag each item or mark the repair desired on the glass in red pencil and have the shipment insured for an adequate amount. We will be happy to give you an estimate if you wish.

Fast Delivery! Leco GLASS BLOWING SERVICE gives you the fastest delivery in the nation!

Custom parts made to your specification or according to description in any technical publication.

LABORATORY EQUIPMENT CORP.
ST. JOSEPH 8, MICHIGAN

CLASSIFIED ADVERTISING RATES

POSITION WANTED — Minimum advertisement set solid, 30 words or less, $3.00. Additional words 10c each.

ALL OTHERS—"Help Wanted"—"For Sale"—"Wanted"—"Personals"—"Services", etc., minimum advertisement set solid, 30 words or less, $6.00. Additional words 20c each.

NOTE—If replies are to be sent to a box number in care of FOUNDRY, add 6 words to your advertisement for box number and address.

Any advertisement set in all capital letters, add 50% to the above rates.

INCH RATES PER INSERTION

Single Column 2¼" Wide	One Time	Three Times	Six Times	Twelve Times
1 inch	$ 18.00	$ 16.50	$ 15.00	$ 13.50
2 inches	32.50	30.00	27.50	25.00
3 inches	46.50	43.00	39.50	36.00
4 inches	60.00	55.50	51.00	46.50
5 inches	73.00	67.50	62.00	56.50
6 inches	85.50	79.00	72.50	66.00
7 inches	97.50	90.00	82.50	75.00
8 inches	109.00	100.50	92.00	83.50
9 inches	120.00	110.50	101.00	91.50
10 inches (1 col.)	130.50	120.00	109.50	99.00
Half page	195.00	180.00	165.00	150.00
Full page	330.00	300.00	270.00	240.00

Remittance should accompany advertisement when submitted—Cash Discount 2%, 10 days.

Classified Forms Close the 13th of Month Preceding Issue

FOUNDRY

PENTON BUILDING • CLEVELAND 13, OHIO

GRAY IRON FOUNDRIES
Simplify Chill Control . . .

with

TELLURIUM

Available in 1, 2, 3, and 4-gram tablets; also in powder, slabs and sticks. For full information, write Dept. LM for 16-page article on the use of TELLURIUM in chill control.

American Smelting and Refining Company
120 BROADWAY • NEW YORK 5, N. Y.

COST CONTROL
WESTOVER ENGINEERS
Westover ENGINEERS
FOUNDRY MANAGEMENT CONSULTANTS
3110 WEST FOND DU LAC AVE., MILWAUKEE 10, WIS.
There is no better time than NOW to review incentives, methods, scheduling, production control and paperwork processes.

WELLMAN
Williams Type

INSTANT "ON-AND-OFF" SERVICE ANYWHERE

The Wellman "Hook-on", single-line bucket is designed to provide clamshell bucket service at any crane hook where suitable head room and hoist capacity are available.

Hook the yoke over the crane hook and the bucket is ready for work. When the job is finished, take the yoke off the hook and the crane is free for other duties.

Capacities from ⅜ to 2 cubic yards. Write for free bulletin.

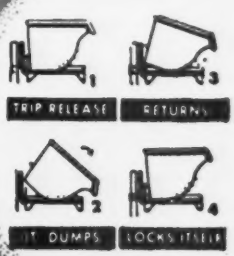
THE WELLMAN ENGINEERING CO. 7019 CENTRAL AVE. CLEVELAND 4, OHIO

EF
GAS, OIL AND ELECTRIC FURNACES
For all annealing and heat treating requirements
THE ELECTRIC FURNACE CO. • SALEM, OHIO
Canadian Associates ● CANEFCO LTD. ● Toronto I. Canada

Step Up **PRODUCTION** *with*
ROURA Self-Dumping **HOPPERS**
—they pay for themselves

Only ROURA Has The Exclusive PATENTED Instant Release Handle

SIMPLE — SAFE — SPEEDY MATERIAL HANDLING



Imitated by Many— Not Equaled by Any

SAVE 50% LABOR-TIME
Use Self-Dumping Containers

Handling wet or dry, hot or cold, bulky materials quickly and easily, the ROURA is simple to operate—only one man is required for distributing and unloading—and he does this in much less time than ordinarily required under old-fashioned manual methods. Thousands of Roura Hoppers (which fit any standard fork or platform lift truck) are in constant daily operation, serving and saving for such firms as Owens-Illinois Glass, Corning Glass, National Fireproofing, General Motors, Ford, Chrysler, American Brake Shoe, General Electric, Westinghouse, Western Electric, American Steel Foundries, International Harvester, John Deere, etc.

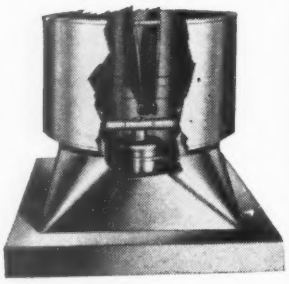
By a simple lift of the exclusive release handle, the ROURA HOPPER dumps, rights and locks itself securely. Sizes—½, ¾, 1, 1½ and 2 cubic yards; the ROURA HOPPER can also be designed for flat trucks and in other sizes to meet specifications. Also, it can be equipped with special flanges that permit stacking to desired tiers for storage or future distribution of materials—conserving valuable floor space. Priced below all competition, the ROURA will quickly pay for itself many times over.

—Can Be Coated With Acid-Resistant Paints

Write today for detailed brochure, "In Dollars & Sense."

ROURA IRON WORKS, Inc.
1417 Woodland Ave. Detroit 11, Mich.

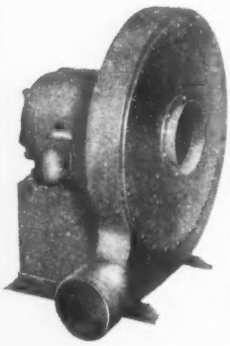
GENERAL AUTOMATIC ROOF VENTILATOR *for* FOUNDRIES



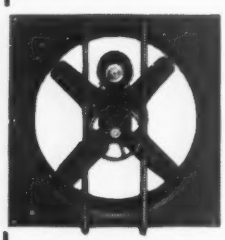
• GENERAL offers the foundry industry the Automatic Roof Ventilator for the removal of large volumes of contaminated air from the pouring and core making rooms.

• This blow-through type ventilator is equipped with a high capacity propeller fan and automatic weather louvres which seal out any kind of weather when the fan is not in use.

• Smoke, fumes, vapors and dust laden air are removed quickly and efficiently with the General Automatic Roof Ventilator.



• GENERAL Turbo Blowers (Type S & M) deliver Air or Gas against pressure or create suction over a range of 4 to 20 ounces; Type M for up to 32 ounces duty. Ideal for operation with crucible melting furnaces, core ovens and cupolas. Also applicable for all types industrial oil or gas burners. *Write for BULLETIN CB107 for Illus. and descriptions of types S and M General Turbo blowers.*



• GENERAL belt-drive propeller EXHAUST fans are large enough to remove the increased volumes of contaminated air for complete ventilation of your foundry. The use of higher speed motors with V-belt drive results in an economical flexible unit. CENTRIFUGAL type fans for removal of hazardous industrial fumes or for conventional ventilating needs are also available. *Write for BULLETIN EF105 which covers capacities and dimensions of both belt-driven and directly connected exhaust fans or bulletin SF101 for propeller type fans.*

Please send copy of

LUNGS FOR INDUSTRIES

8603 FERRIS MORTON GROVE, ILL.

Designers & Engineers

MFRS. FANS • BLOWERS • EXHAUSTERS

"LUNGS FOR INDUSTRY"

GENERAL BLOWER CO.

PLANT & GENERAL OFFICES • MORTON GROVE, ILL.

SALES OFFICES IN PRINCIPAL CITIES

PHILADELPHIA COKE

PHILADELPHIA COKE COMPANY

4501 Richmond St.

Philadelphia 37, Penna.

PHONE: DELAWARE 6-3100

•

Producers of

FOUNDRY · METALLURGICAL

INDUSTRIAL COKE

Having Trouble With Casting Rejects?

TRY

WATERLOX

TRANSPARENT

CASTING SEALER

Eliminate leaky castings by impregnation. Save time, money, labor and materials.

WRITE TODAY FOR DETAILS

WATERLOX DIVISION

of

THE EMPIRE VARNISH COMPANY

2636 E. 76th St. CLEVELAND 4, OHIO

TOPS FOR PRODUCTION OF HIGH GRADE STAINLESS, ALLOY AND RIMMING STEELS

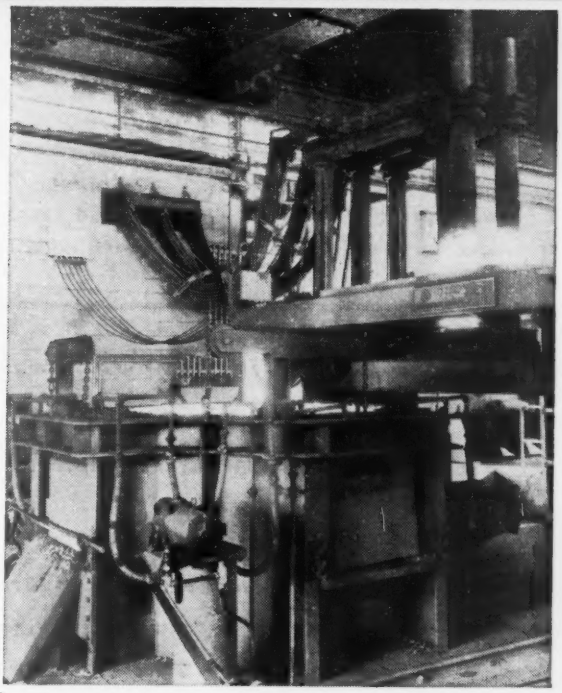
Heroult

ELECTRIC MELTING FURNACES

EMBODYING the latest in mechanical and electrical equipment, these widely used furnaces are noted for their efficient performance and safety, and low operating cost and maintenance.

We welcome an opportunity to help you select and install the furnace best suited to your particular requirements.

AMERICAN BRIDGE DIVISION, UNITED STATES STEEL CORPORATION
GENERAL OFFICES: 525 WILLIAM PENN PLACE, PITTSBURGH, PA.
Contracting Offices in New York, Philadelphia, Chicago,
San Francisco and other principal cities.
United States Steel Export Company, New York

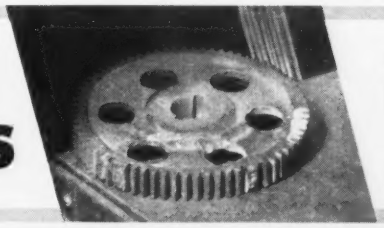


Removable roof of new design now available for large furnaces.

USS

UNITED STATES STEEL

SALVAGE CASTINGS



with MARQUETTE NICOL-ROD No. 44
Cast or Malleable Iron
Machineable . . . without Preheating

Worth its weight in gold for repairing defective castings, castings sand pockets, machining errors, etc.

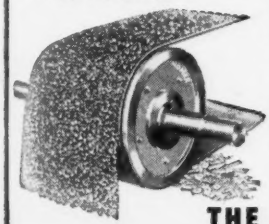
Marquette Manufacturing Co., Inc.
307 E. Hennepin Ave.
Minneapolis 14, Minn.

CROBAUGH LABORATORIES
Chemists—Metallurgists
FOUNDRY SERVICE
THE FRANK L. CROBAUGH CO.
Phone SUperior 1-4712 CLEVELAND 13, O.

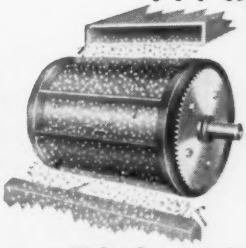
A. A. WICKLAND & CO.
FOUNDRY CONSULTANTS
ENGINEERING BUILDING · CHICAGO 6, ILLINOIS

FOR SAND SLINGERS, CONDITIONERS AND CONVEYORS . .

HERE IS THE ANSWER TO YOUR MAGNETIC SEPARATOR JOBS!
HOMER "Power-Plus" Magnetic Separators
Permanent non-electric—Unaffected by Heat, Cold, Moisture
. . . CAN BE USED INSIDE or OUTSIDE PLANT . . .

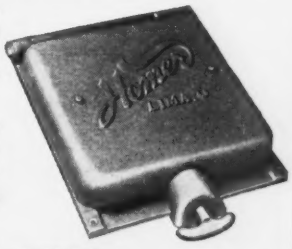


Homer MAGNETIC PULLEYS and UNITS—Available in standard diameters from 12" to 30"; belt widths 4" to 60". Special sizes upon order.



Homer MAGNETIC DRUMS—Available in standard diameters from 12" to 30"; face widths 4" to 60". Can be furnished with or without enclosure.

Homer MAGNETIC PLATES—Available in standard widths from 4" to 26"; lengths and number of poles as required. Special fabrications to your specifications.

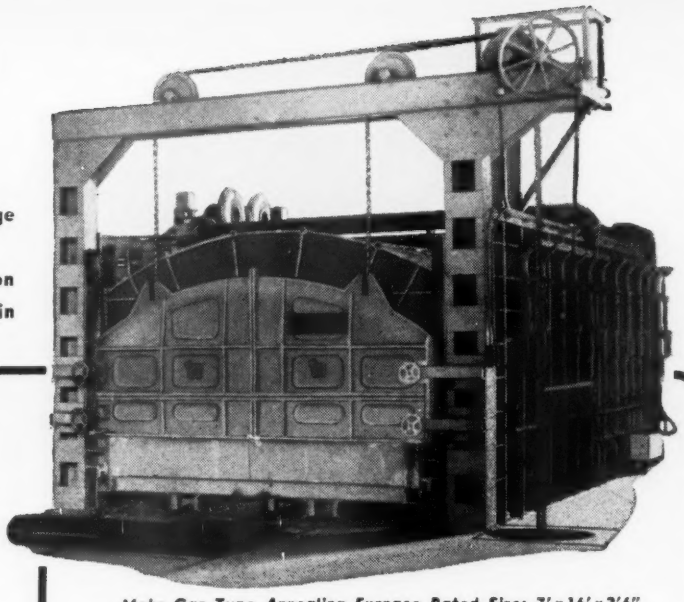


Write for descriptive bulletins
THE HOMER MANUFACTURING CO., INC., DEPT. 156, LIMA, OHIO

MAHR CAR BOTTOM ANNEALING FURNACES

Give you . . .

● Faster heat ● Wider temperature range ● More uniform heat penetration ● Lower operating costs ● More rugged construction for longer service life ● Over 40 years experience in furnace building



Mahr Car Type Annealing Furnace Rated Size: 7′ x 16′ x 3′6″

COMES EQUIPPED FOR . . .

Oil or Gas Firing—Manual or Automatic Temperature Control

ARE ADAPTABLE FOR . . .

● Carburizing ● Hardening ● Drawing ● Normalizing ● Stress Relieving ● Tempering ● Spheroidizing

OTHER MAHR FURNACES:

Standard • Batch • Pusher • Continuous • Rotary • Pit • Gas or Oil Fired

WRITE for Equipment Bulletin No. 200. Specifications cover 23 rated sizes from 4′ x 6′ x 2′ to 9′ x 20′ x 4′6″. Complete information supplied promptly on any other size.

MAHR MANUFACTURING CO.
DIVISION OF DIAMOND IRON WORKS, INC.
MINNEAPOLIS, MINNESOTA, U.S.A.

1804 N. 2ND ST.

PENN BUCKETS

No. 9-A Self-Dumping Swivel Wheel Bucket

Careful balancing makes Penn Buckets self-dumping when loaded and self-righting when empty. Welded construction prevents "clinging", makes them empty easily and completely. The swivel wheels increase handling efficiency, too.

FEMA

WRITE TODAY FOR NEW BULLETIN DIMENSION SHEET AND PRICE LIST

PENN IRON WORKS, INC.
READING, PENNA.

FOUNDRY

EDWIN S. CARMAN, INC.

LEE ROAD AT MAYFIELD
CLEVELAND 18, OHIO

A COMPLETE FOUNDRY SERVICE

MECHANIZATION

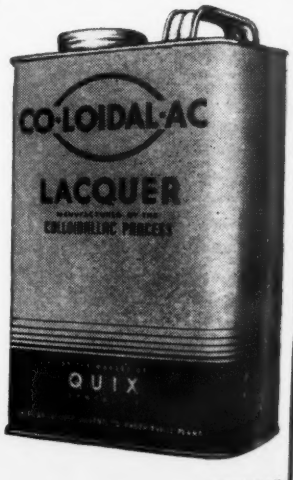
Patterns COME CLEAN

from the sand when they are coated with hard, heat-and-abrasion resistant CO-LOIDAL-AC Lacquer. You will like the improved mold quality obtained and the extra long life of this superior finish.

Direct factory-to-you sales makes possible exceptional value. Available in gallons or drums, clear or colors. Place in trial order today.

WRITE FOR COMPLETE INFORMATION

AMERICAN LACQUER SOLVENTS CO.
Perkiomen Junction, Phoenixville, Pa.



CLASSIFIED ADVERTISING

Help Wanted

FOUNDRY SUPERINTENDENT

Successful Malleable (Duplex) Eastern Foundry, employing a total of two-hundred-fifty people, has a real opportunity for a man who has the experience and know-how to take complete charge of production. Our problem is not getting business, it is the development of a larger volume of saleable castings. The technique to detect and cure causes of defective castings, such as cracks, porosity, and other production defects, is of vital importance.

Please do not make application for this position unless you have demonstrated, or feel certain that you can fill this very important and well-paying position on demonstrated ability.

BOX 728

FOUNDRY CLEVELAND 13, OHIO

FOUNDRY SUPERVISORY PERSONNEL

Qualified foreman for all operations in highly mechanized, established malleable foundry. Positions open immediately. Must be familiar with progressive foundry techniques. State qualifications. Located: Midwest.

BOX 701

FOUNDRY CLEVELAND 13, OHIO

EXPERIENCED BRASS FOUNDRY SUPERINTENDENT

To operate and supervise entire foundry operations of a jobbing manufacturer located in Northeastern Ohio. Castings ranging from 1 pound to 2500 pounds.
Must have technical knowledge and ability in all phases of brass foundry work.
The nature of the position, salary, stability, location, working conditions and company benefits make this an extremely attractive opportunity. Address replies in full confidence giving full information to:

BOX 691

FOUNDRY CLEVELAND 13, OHIO

METALLURGIST

Steel foundry, Midwest. Recent graduate. For shop investigations and sand control. Excellent opportunity with company organizing for the application of modern foundry technology. Write full details of education, experience and personal background. Address: Box 712, FOUNDRY, Cleveland 13, Ohio.

FOREMAN

To take complete charge of newly mechanized malleable foundry. Must have experience and be familiar with latest molding techniques. Good opportunity. Eastern Location. State experience and salary desired. Address: Box 719, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY METALLURGIST

With experience in cast iron foundry practice. Prepared to travel. State age, experience, and salary required. Address: Box 704, FOUNDRY, Cleveland 13, Ohio.

PATTERN SUPERVISOR

For key job modern production foundry.

Must be journeyman wood pattern maker, able to take charge of wood, metal, and foundry set-up. Experience in automotive foundry work preferred. Must have knowledge of gating, core blowing, rigging, etc. Age 40 to 50.

Exceptional opportunity for right man.

Apply giving particulars including age, experience, references, how soon available, and salary expected.

BOX 698

FOUNDRY CLEVELAND 13, OHIO

CONSULTING AND SERVICE METALLURGIST

Must have technical background and malleable foundry experience.
Should have inclination and personality to work towards sales position and be prepared to travel. Write stating full details and salary expected.

BOX 729

FOUNDRY CLEVELAND 13, OHIO

METALLURGIST

Gray iron foundry in need of young man with technical background to become Metallurgist. Write, give name and full details also, salary expected.

BOX 731

FOUNDRY CLEVELAND 13, OHIO

FOUNDRYMAN

To take charge of quality and sand control in newly mechanized foundry. Good opportunity. Eastern location. State experience and salary desired. Address: Box 720, FOUNDRY, Cleveland, 13, Ohio.

Help Wanted

SUPERINTENDENT OR GENERAL FOUNDRY FOREMAN

For a medium sized gray iron foundry located in Massachusetts.
State experience and salary expected.
All replies confidential.

BOX 750

FOUNDRY CLEVELAND 13, OHIO

FOUNDRY SUPERINTENDENT

Take complete charge. Must have thorough knowledge of metallurgy and sand control. Excellent opportunity. Top earnings. Eastern Pennsylvania location. Write fully on experience; state salary desired.

BOX 737

FOUNDRY CLEVELAND 13, OHIO

SUPERINTENDENT

Opportunity for well qualified, experienced superintendent of nonferrous foundry employing 100-150 people. Applicant should be between 35-45. Enclose photograph and give complete record of education and experience in detail including previous employment and length of service. Address: Box 722, FOUNDRY, Cleveland 13, Ohio.

GENERAL FOUNDRY FOREMAN OR SUPERINTENDENT

For sand slinger and jolt squeeze machine mechanized gray iron foundry. New foundry just in operation in Tennessee. Job requires all time spent in shop. Applicant must be experienced in this type operation. In replying, list qualifications, experience, references and salary expected. All communications treated confidentially. Address: Box 730, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY TECHNOLOGIST

Preferably with some experience in cast iron. Should be prepared to travel. State salary required and full qualifications. Address: Box 705, FOUNDRY, Cleveland 13, Ohio.

METALLURGIST ELECTRIC STEEL FOUNDRY

Prefer a man with carbon and alloy experience. Must be a graduate Metallurgist. Write giving full details on personal background, experience and salary expected. Good opportunity for a progressive man. Address: Box 736, FOUNDRY, Cleveland 13, Ohio.

CORE ROOM SUPERINTENDENT

For completely mechanized Eastern foundry. Experienced in all phases of core blowing, sand control and establishing production standards. State age, experience and salary requirement. Address: Box 649, FOUNDRY, Cleveland 13, Ohio.

SUPERVISOR

Thoroughly experienced in high production mechanized jobbing foundry operation. Must have record of ability to handle men and thorough knowledge of modern equipment and methods. Established Eastern Foundry. State age, experience and salary. Address: Box 655, FOUNDRY, Cleveland 13, Ohio.

CORE ROOM FOREMAN

Experienced in steel foundry practice. In replying give complete information which will be held in strict confidence by a single executive. Address: Box 726, FOUNDRY, Cleveland 13, Ohio.

WANTED

Qualified and experienced steel foundry engineer for big concern in India situated at port. Salary according to merits. Apply airmail G.P.O. Box #586, Bombay 1, India, with copies of testimonials, stating minimum terms and joining time.

Representatives Wanted

SALES REPRESENTATIVE

Supplies, facings, binders, equipment. Rhode Island and Connecticut. We manufacture and warehouse. Represent leading companies. Complete line including all equipment. Reply in detail in confidence. Address: Box 753, FOUNDRY, Cleveland 13, Ohio.

Representatives Wanted

SALESMEN

TO REPRESENT

REPUTABLE SMELTER

IN

MICHIGAN

INDIANA

OHIO, ILLINOIS

TO SELL BRASS

AND ALUMINUM INGOT

ADVISE FULL DETAILS

BOX 727

FOUNDRY CLEVELAND 13, OHIO

SALESMAN

Familiar with Midwestern foundries to sell and service a basic foundry material. Technical background helpful but not necessary. Write giving full details and reference. Address: Box 687, FOUNDRY, Cleveland 13, Ohio.

SALESMAN WANTED

Steel casting firm desires salesman with background to sell carbon, low alloy and stainless castings on Eastern seaboard.
Firm now producing pressure castings. Has X-Ray equipment and complete facilities.
State qualifications in reply.

BOX 685

FOUNDRY CLEVELAND 13, OHIO

SALES REPRESENTATIVE

Supplies, facings, binders, equipment. Virginia, North and South Carolina. We manufacture and warehouse. Represent leading companies. Complete line including all equipment. Reply in detail in confidence. Address: Box 754, FOUNDRY, Cleveland 13, Ohio.

SALESMAN

Foundry Supply Salesman for Kalamazoo, Muskegon, Grand Rapids territory. State experience. Address: Box 725, FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

FOUNDRY EXECUTIVE

Gray iron, 28 years' experience in production and jobbing, 10 years as a manager of plants with daily tonnages as high as 125 ton, employing up to 300. Man of unquestionable character and excellent ability. Know foundry thoroughly. Address: Box 661, FOUNDRY, Cleveland 13, Ohio.

ENGINEER

Graduate engineer seeking position in product development and mechanical research field with progressive foundry organization with view of ultimate progression to sales, engineering, or operating top levels. Past experience in all steel foundry departments. Now heading small engineering department. Age thirty-eight. Address: Box 746, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY EXECUTIVE (NONFERROUS)

Vice-President and General Manager, 30 man nonferrous foundry and machine shop, handling sales, purchasing, production and labor relations. Metallurgical education and 20 years experience in the nonferrous foundry field as metallurgist, foreman of heat treating, research engineer, director of research, advertising manager before reaching management level. Age 42. Will relocate. Address: Box 724, FOUNDRY, Cleveland 13, Ohio.

FOREMAN—WOOD PATTERNMAKING OR PURCHASING PATTERNS AND CASTINGS

Iron and steel background, medium to heavy industry. Will relocate. Address: Box 735, FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

SUPERINTENDENT OR GENERAL FOREMAN

Experienced in all phases of foundry practice—molding, melting, coremaking, cleaning, heat treating, sand mixtures, gates and risers—carbon, alloy and corrosion resisting steels—pressure castings. Thirty years in foundry, eighteen years superintendent and general foreman. General jobbing and production. Now available. Address: Box 739, FOUNDRY, Cleveland 13, Ohio.

MANAGER OR GENERAL SUPERINTENDENT

Magnesium, aluminum or bronze; practically all phases foundry, including melting, synthetic sands. Quality minded, production wise, executive, group leader, personnel relations, good organizer. Set up shop from beginning. Prefer New England or Eastern States. Middle aged, good health, excellent references. Address: Box 717, FOUNDRY, Cleveland 13, Ohio.

INDUSTRIAL ENGINEER

Seeking managerial position, requiring initiative and executive ability, with progressive company, Eastern U. S. Specialist in foundry problems, have had wide experience in 15 plants in U. S., Canada and Western Europe—gray iron, malleable, and brass. Familiar with shellmolding techniques. Present position: foundry consultant to six European affiliates of American corporation. Address: **F. P. BENSON, JR., 149-151 BLVD. HAUSSMANN, PARIS 8, FRANCE.**

SAND CONTROL FOREMAN

Now employed by a large malleable foundry. In complete charge of all molding sand, several years in sand control. Familiar with all phases of foundry work. Young and capable of reducing scrap and sand costs. Desire change offering opportunity of advancement. Address: Box 732, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY METALLURGIST

B.S., Met. Eng. Six years' experience in gray iron, alloy iron, steel, cupola and electric furnace operation. Sand and permanent molds. Address: Box 718, FOUNDRY, Cleveland 13, Ohio.

INDUSTRIAL ENGINEER

Several years of experience in gray iron, malleable and steel. Will reduce cost and increase production. Very capable of running department efficiently, also assist management in all problems. Address: Box 748, FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN

Experienced in casting brass, gray iron, aluminum for jobbing and government requirements. Also shell molding and centrifugal casting. Past experience as foundry manager, works manager and consultant engineer. Address: Box 744, FOUNDRY, Cleveland, 13, Ohio.

PATTERNMAKER

Experienced wood and metal, also cast matchplates, sand and precision cast plaster plates and core boxes using plaster molds. Have most of equipment needed to cast plates. Prefer shop doing pattern work where could set up matchplate work with pattern work and precision castings. Address: Box 742, FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN

Electrical engineer and practical man. Thirty years as superintendent of maintenance and construction of steel, highly mechanized gray and malleable iron foundries. Trained for labor relations, and controlled maintenance. Address: Box 733, FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN

Twenty-nine years' experience in capacity of chemist, foreman of various departments, and during the past sixteen years have held position of plant superintendent in two different foundries. Wide experience in all phases of foundry practice. Age 47. Address: Box 752, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY METALLURGIST

Married, 30, degree in Metallurgy plus a four-year foundry apprenticeship. Broad background dealing with nonferrous casting problems. Desire position as a foundry metallurgist or in foundry supervision. Address: Box 749, FOUNDRY, Cleveland 13, Ohio.

PATTERNMAKER

Wood, metal, plaster. Forty years experience job shop and foundry patterns. Know matchplate, sand and plaster work with metal core boxes and driers as well as core blowing. Any type patterns small or large wood work. Metal matchplate work etc. Address: Box 743, FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

GRAY IRON FOUNDRYMAN

Available. Capable, qualified and experienced to direct all phases of foundry activities. Light to medium heavy work. Green and dry sand. Well versed in cupola operation and metallurgy. Fifteen years in present executive position. Middle aged. Good appearance. Pleasing personality. Address: Box 620, FOUNDRY, Cleve-

FOUNDRY EXECUTIVE

Well versed in all foundry procedures. Consulting on metallurgy, sand, quality control, melting procedures, production and general foundry problems. Desire position with gray iron foundry. References. Address: Box 751, FOUNDRY, Cleveland 13, Ohio.

PLANT SUPERINTENDENT

Twenty-five years' experience in jobbing and production of gray iron castings. Thirteen years in executive capacity. Production and sales promotion background in developing small foundries. Age 47, married, good health. Address: Box 721, FOUNDRY, Cleveland 13,

SUPERINTENDENT OR GENERAL FOREMAN

For cleaning division, well qualified to head this department, if you want your hours and cost reduced. Also experience in standards and methods. Address: Box 747, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGER

Unusual combination of technical, practical and executive experience in gray iron, machine tool field. Now a successful foundry consulting engineer. Profit making ability established. Under 45. Address: Box 745, FOUNDRY, Cleveland 13, Ohio.

Foundry Work Wanted

WANTED

Heavy Floor Work
Gray Iron Castings
500 to 10,000 Pounds

Controlled metal with specifications to meet your requirements. Phone or wire collect.

THE J. B. EHRSAM & SONS MFG. CO.
ENTERPRISE, KANSAS

Foundries For Sale

FOR SALE OR RENT

Small gray iron foundry between Chicago and Milwaukee. 36" cupola, 600# Stroman Oil Furnace, and 120# Detroit Electric Furnace in operation. Concrete block building with room for expansion along siding of main route railroad. Ideal for small manufacturing concern needing iron, aluminum, or brass castings. Would consider partnership with right man. Liberal terms.

BOX 738

FOUNDRY CLEVELAND 13, OHIO

SMALL FOUNDRY FOR SALE

On New York Central Railroad side track in Lockport, New York. Floor space of molders approximately 11,000 square feet with exceptional dumping ground for disposal of slag and waste indefinitely at lowest expense over declivity on the land. Considerable foundry equipment thrown in for the price of assessed value of the real estate. Address: JEFFERSON UNION COMPANY, LOCKPORT, NEW YORK.

FOR SALE

Gray iron foundry in central Michigan specializing in boat anchors, City of Flint manhole castings, all kinds of furnace castings, State Roadside Park Grates, Board of Education boiler grates, and numerous other jobs. Orders guaranteed. Must sell because of ill health. Address: Box 669, FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Brick and steel foundry, Southern Illinois, 160 x 320 feet, overhead monorail water transportation available. Ideal for mechanized operation, contains equipment. Address: Box 702, FOUNDRY, Cleveland 13, Ohio.

CLASSIFIED ADVERTISING

Employment Service

EMPLOYMENT COUNSEL, INC.
"All The Name Implies"
JOHN COPE, Manager Foundry Dept.

Recruiting men for employers in the foundry industry throughout the nation. Openings in Steel, Malleable, Gray Iron and Non-Ferrous—Jobbing and Production. Salaries to $20,000.

PLANT MANAGERS	SUPERINTENDENTS
GENERAL FOREMEN	MOLD FOREMEN
CORE FOREMEN	MELTING FOREMEN
CLEANING FOREMEN	MAINTENANCE FOREMEN
PATTERN FOREMEN	METALLURGISTS
INDUSTRIAL ENGRS.	TIME STUDY ENGRS.

And all other Administrative and Sales Positions
WRITE or CALL for registration.
Completely Confidential.

SUITE 500
CHICAGO 2, ILLINOIS

7 WEST MADISON ST.,
FINANCIAL 6-2100

Foundries For Sale

FOUNDRY FOR SALE

For sale or rent, gray iron foundry North side of Chicago. Going concern capacity 800 tons per month. Equipped for heavy work up to 20,000 pounds.

Overhead travelling crane, number 6 Whiting cupola, 6 core ovens, large inventory of materials.

Goodwill and accounts also for sale. Established 30 years. For further details contact:

BOX 716

FOUNDRY **CLEVELAND 13, OHIO**

FOUNDRY FOR SALE

Fully equipped gray iron foundry in Central Wisconsin doing jobbing and production work up to ten tons per day capacity. $36,000 full price. Address: Box 740, FOUNDRY, Cleveland 13, Ohio.

Wanted-To-Buy

WANTED

1—Hough Payloader
1—No. 2 Simpson Mill
1—No. 3 Simpson Mill
2—No. 2136 G-S.P.O. Portable Jolt Squeeze pin lift machines
2—Osborn #712 Portable Jolt Squeeze pin lift machines.
ALL EQUIPMENT MUST BE IN GOOD CONDITION.

MARCH BROWNBACK CO., INC.
SOUTH & CHARLOTTE STS.
POTTSTOWN, PENNSYLVANIA

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price or immediate acceptance. Address Box 578, FOUNDRY, Cleveland 13, Ohio.

MACHINERY WANTED

Induction Furnaces, Screens, Simpson Mixers, Riehle Compression Testing Machines, Pulverizers, Grinders, Conveyors. Address: **P.O. BOX 1351, CHURCH STREET STATION, NEW YORK 8, NEW YORK.**

WANTED TO BUY

Simpson Laboratory Muller. Give complete details and price. Address: Box 723, FOUNDRY, Cleveland 13, Ohio.

Wanted-To-Buy

WANTED

Large Midwestern manufacturer is interested in purchasing for cash one used Pittsburgh Lectromelt Furnace in good operating condition. Will consider any of the following models of this furnace: "RT", "R", "ST" or "S".

BOX 708

FOUNDRY **CLEVELAND 13, OHIO**

WANTED

Electric Melting Furnace 250" to 3 ton heat capacities.

BOX 734

FOUNDRY **CLEVELAND 13, OHIO**

#2 SIMPSON MULLER WANTED

No. 2 or 3 Simpson or No. 50 or 60 Beardsley & Piper with loader. Vibrating or apron conveyor medium sized mold Shakeout unit.

PIONEER FOUNDRY & MFG. CO., INC.
P. O. BOX 118
GILBERTVILLE, MASS.

Equipment Wanted

One or two portable jolt rollover machines, preferably Tabor, approximately 30 x 40. Write or phone: **MR. DONALD CHARLETON, NATIONAL FOUNDRY CO. OF NEW YORK INC., 10 SANDFORD STREET, BROOKLYN, N. Y., TELEPHONE: ULSTER 2-8200.**
PRIVATE SURPLUS EQUIPMENT

Wanted-To-Buy

WANTED TO BUY

1—Davenport Jolt Rollover Draw Molding Machine, Model 34A or 34SA
1—B & P Stationary Sandslinger 19" Head, 2 Speed Motor
1—Stoney Core Knockout Machine, Type CA 6

BOX 741

FOUNDRY **CLEVELAND 13, OHIO**

For Sale

FOR SALE

WHEELABRATORS	
1—20 x 27 American Wheelabrator Serial Number A-48021	$1750.00
1—27 x 36 American Wheelabrator Serial Number A-45922	2500.00
MOLDING MACHINES	
6—#2047 Osborn Jolt Rollover Pattern Draw molding machines—1943 Each..	275.00
4—Model 601-13 Osborn Jolt Rollover Pattern Draw machines..Each.....	350.00
1—#405 Osborn Jolt Rollover molding machine—79" table	1000.00
1—#413-3 Osborn Jolt Rollover Pattern Draw molding machine; 130" x 42".	6500.00
1—SPO Model 914 Jolt Rollover Squeeze molding machine	250.00
1—SPO Model 2136-1 Jolt Squeeze Strip Molding machine—Ser. No. 210	700.00
2—International machines; 12" cylinder-rebuilt.	375.00
4—Osborn Model 275J Jolt Squeezers .....Each.....	125.00
1—#1 Johnston & Jennings Jolt Squeeze, Strip Molding machine	175.00
1—#918 Johnston & Jennings Air-Clamp-Jolt Leveler,Rollover Pattern Draw..	1500.00
1—International JDP 600 lb. capacity, Molding Machine; 8" draw, portable	475.00
1—Herman Jar Rollover & Pattern Draw Molding Machine; table 48" x 144", 24" Cylinder, Air Clamps, etc.....	OFFER
SANDSLINGERS	
1—Beardsley & Piper Tractor Type Sandslinger with magnetic tower—13' arm	7500.00
1—Beardsley & Piper Motive Junior Sandslinger with 2 speed ramming motor, 19" head; hopper type; with magnetic separator	7500.00
FURNACES	
1—Strohman Aluminum Furnace—reverberatory type; 1200 lb. cap. gas fired; with skip hoist and hydraulic tilting equipment	$3000.00
CORE BLOWERS	
1—Model 91 Osborn—Ser. No. 10786D for small cores	750.00
3—Model 193-4 Osborns—for medium cores; cylinder draw type....Each..	1500.00
2—Model 94 Osborn—for very large cores .....Each	2500.00
MISCELLANEOUS	
1—#40 B & P Speedmuller with skip hoist, latest type, Serial Number 40-2	3000.00
1—#404 Clearfield Mixer	1000.00
2—Osborn Core Rollovers, Model 2042; power rollovers, hand draw..Each..	250.00
1—Handy Sandy Model HS 7 GT—complete unit with 4 hoppers & conveyor	3500.00
1—Hyster Fork Lift Truck—with pneumatic tires; 15,000 lb. cap.	4500.00
1—Marschke Swing Frame Grinder—10 HP	650.00
1—Marschke Double End Grinder—7½ HP.	275.00
2—75 HP Ingersoll Rand Air Compressors	OFFER
1—3000 lb. Electro-Lift hoist with jib crane	550.00

BALCHER MACHINERY COMPANY
1884 S. COMPTON ROAD
CLEVELAND HEIGHTS 18, OHIO
TELEPHONE: FAIRMOUNT 1-1186

FOR SALE

Core Sand Mixer, Baker-Perkins size 16½, type DIM "Unidor", 30 HP motor drive. Excellent condition. Yours for one-third of cost. Address: Box 697, FOUNDRY, Cleveland 13, Ohio.

For Sale

For Sale

WE BUY AND SELL

MOLDING MACHINES:
- Jolt Squeeze
- Rollover and Pattern Draw
- Jolt Squeeze Pin Lift
- Jolt Pin Lift

SAND SLINGERS
- Beardsley-Piper

MOLD CONVEYOR
- Link-Belt

CORE BLOWERS
- Osborn
- Demmler
- Redford

SAND MULLERS
- Simpson
- Beardsley-Piper
- Link-Belt

FURNACES
- Hausfeld 500# tilt
- Hausfeld 40# non-tilt

CLEANING CABINETS
- Hydro Whirl f. Magnesium

VARIOUS SIZES STEEL FLASKS.

GRINDERS:
- Stand, double end
- Disc single & double end
- Fin grinding f. cylinder heads

SHAKE-OUTS:
- Simplicity
- Robbins

VIBRATORS:
- Jeffrey #3 and #4

SCALES:
- Car and Floor

CHARGING CRANES
- 3 ton Sheppard

POURING LADLES
- Modern & Whiting 2000#

BLOWERS
- Cupola and furnace

IMPREGNATING ROOM
- Complete installation

CORE OVEN
- Young Brothers 2 compartment

WE ALSO BUY AND SELL COMPLETE FOUNDRIES.

EUCLID FOUNDRY & MACHINE EQUIPMENT CO.,

15019 SARANAC RD., CLEVELAND 10, OHIO.

TELEPHONE: GLENVILLE 1-1538, 1-1222.

FOR SALE

NEWAYGO UNITS (NEW 1952)

One Twin Overhead Hopper Handy Sandy with air operated hydraulic sand gates.
One Elevator Tower with Aerator.
One Feeder Hopper with conveyor belt to Elevator Tower. Feeder Hopper has power-driven screw conveyor for unloading conditioned sand without interrupting overhead hopper service.
One Reddy-Sandy Shakeout unit with moistener and aerator delivering conditioned sand to Feeder Hopper.

BUFFALO PATTERN WORKS, INC.
830 HERTEL AVENUE
BUFFALO 16, NEW YORK

PRICED RIGHT FOR QUICK SALE

BUSCH SPRUE CUTTER, heavy duty for steel, 8" throat, capacity 1¾" square, 2½" round, equipped with 7½ HP, AC motor.
INTERNATIONAL CORE BLOWER #SB11, 15" x 24" Table.
MILWAUKEE ELECTRIC HOIST 1 ton capacity, 2 motors, motorized trolley, 10' lift.

GLOBE MACHINERY CO.
602 W. LAKE STREET, CHICAGO 6, ILLINOIS
ANDOVER 3-4185

FOR SALE

New International Type SB-13 Core Blowing Machine, with rollers in the draw section. This machine has never been used and is available for immediate delivery. Make us an offer.

S. CHENEY & SON
MANLIUS, NEW YORK
PHONE 62-2011

FOR SALE

1—Model 36-R DoAll Zephyr band sawing machine, 1000 to 5000 B.F.M. complete with all standard equipment 220-60-3.
This machine purchased December, 1952 and practically new. Cost $3,148.00. Used six weeks. Will sell for $2,800.00.

LAVELLE NON-FERROUS CASTING CO.
P. O. BOX 798 ANDERSON, INDIANA

FOR SALE

One #812 Johnson and Jennings Jolt Pin Lift Machine. This machine is like new and has never been taken out of original skids and crate and is just as received from factory. Original cost: $1650.00. Make offer. Address: **REXITE CASTING COMPANY, 4535 POPE AVENUE, ST. LOUIS, MISSOURI.**

PRICED TO SELL
NEW AND SLIGHTLY USED STEEL FLASKS

WELDED STEEL FLASKS
10—Copes—36" x 36" x 10"
10—Drags—36" x 36" x 8"
WELDED STEEL TIGHT FLASKS
16—Copes—50" x 50" x 8"
8—Drags—50" x 50" x 10"
8—Drags—50" x 50" x 14"
PRESSED STEEL TIGHT FLASKS
10—Copes—22" x 36" x 8" with bars
10—Drags—22" x 36" x 6" without bars
10—Drag Jumpers—22" x 36" x 6" without bars
10—24" x 38½" Steel Bottom Boards
12—Copes—24" x 24" x 6" with bars
12—Drags—24" x 24" x 11" without bars
12—Drag Jumpers—24" x 24" x 6" without bars
12—26" x 26" Steel Bottom Boards
CAST IRON TIGHT FLASKS
9—Copes—24" x 24" x 6" with bars
9—Drags—24" x 24" x 11" without bars
10—Drag Jumpers—24" x 24" x 6" without bars
5—Copes—24" x 28" x 7½" with bars
5—Drags—24" x 28" x 7½" without bars

INTERNATIONAL HEATER COMPANY
101 PARK AVENUE
UTICA 2, NEW YORK

FOR SALE

TURBO BLOWERS WITH MOTORS

CFM	PRESS.	MAKE	CFM	PRESS.	MAKE
4500	16 oz.	G.E.	660	20 oz	A-B
3500	40 oz.	Spencer	500	10 oz.	No.Am.
2800	1 oz.	Spencer	400	4.3 oz.	Spencer
2700	16 oz.	No.Am.	340	20 oz.	A-B
2700	16 oz.	Spencer	320	12 oz.	Spencer
2500	7 oz.	Sturt.	225	16 oz.	Spencer
2000	2½ oz.	Spencer	180	15 oz.	Spencer
2000	1 oz.	Spencer	9100	7" SP	Sturt.
1150	20 oz.	No.Am.	1100	4½" SP	Bayley
800	8 oz.	No.Am.	100	7" SP	Spencer

THE MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVE.
CLEVELAND 14, OHIO

FOR SALE

1—American Sandcutter A.M.
1—Spencer Turbo Compressor—1350 Cu. H.P.M. @ 32 oz. 25 H.P. Westinghouse Motor
2—Simplicity Shakeout Screens 4 ft. x 6 ft.
1—American Wheelabrator Tumblast 36 x 42 with skiphoist.

MARCH BROWNBACK CO., INC.
SOUTH & CHARLOTTE STS.
POTTSTOWN, PENNSYLVANIA

FOUNDRY EQUIPMENT

MOLDING EQUIPMENT

Herman Jolt Rollover #6000, 40" x 60", 1947
2—Herman Jolt Stripper, 48" x 54", 1947
Osborn Jolt Roll Over, model 405S, with Roll out Car 44" x 48"
7—275 J Osborns—late type
1—75J Osborn
10—SPO Squeezers 110J
29—2047-4 Osborns Jolt & Draw
1—558 Osborn Pin Lift
5—Haynes Squeezers
2—Adams 12 x 38 Squeezers
4—Milwaukee Squeezers
1—#331 Osborn Jolt Rollover
2—Int'l. Portable 24 x 30 Rollover

MOLD HANDLING
& SHAKEOUT EQUIPMENT

Productive Shakeout 6 x 8
900 ft. 10" Logan Roller Conveyor 3½" dia
Jeffrey Powered Wood Slat Conveyor

SAND HANDLING EQUIPMENT

Unit A Syntron Feeder Hopper, 6' x 6'
2—Aerator, Overshot type, 9' x 2' & 4' x 3'
Aetna Sperser System
Simplicity Shaker, model C
Belt Conveyor Systems
Simplicity Gyrating Screen 2' x 3'
4—Green Sand Hoppers 4 yd. cap.

CRANES & HOISTS

15—Curtis Traveling Bridges, 15' span
16—Curtis Air Hoist, 5 & 6" Cylinders, 3½' x 4' Lifts

CUPOLA & LADLE EQUIPMENT

Roots-Connersville Blower, 14 x 36, 30 hp., late
Roots Connersville Blower, 22 x 66, 75 hp
#7½ Roots Connersville Blower 13,000 cfm
North American Centrifugal Blower, 3000 cfm
Spencer Turbo Blowers, 2250 cfm @ 16 oz.
2850 @ 16 oz.
2—#9 Whiting Cupolas
Geared Ladles—1 ton to 4 ton—tilt.

MISC. FOUNDRY EQUPT.

15,000 ft. #458 Chain Conveyor with Trolleys
Brinell-Rockwell-Richie Testers
2—Int'l SB11 Core Blowers
Demmler #1 Core Blower
Despatch E3245 Core Oven, gas.
Porbeck C-3C drawer type Gas Core Oven
3—12 x 12 Pangborn Sand Blast Rooms, with Dust Collectors
2—Lindberg Fisher 225 lb. tilting Furnaces & Blowers
Baker Lift Truck, 6000# cap., 1948
Yale Lo Lift, Redi power
Logan Wood Slat Conveyor, motorized, 36" x 35' Roller Conveyor
15—Double End Grinders
#124 Gardner 53 Horiz. Grinder
1—U. S. Double End Grinder—Late
1—Standard Buffer & Polisher
Tons of Flasks 12 x 18 to 48 x 120
Core Blower, Champion, model CB400, 300 lb.
Roto-Clone units, 24W & 36W, with sludge ejectors
Vibrators, Osborn, 1⅝" x 2"
Welded Steel Pouring Crucibles, new. 1700#
Electrified Monorail
2—McLeod Tumbling Barrels
Bottom Dump, Sand Buggies
Exhaust Fans—to 60"
Fire Extinguishers—CO2
Exhaust Blowers—all sizes

WE WILL BUY—FROM 1 PIECE UP TO ENTIRE FOUNDRY

GREENE BROTHERS
(FORMERLY ASSOCIATED WITH ALLIED MATERIALS HANDLING CO.)
511 FREEMAN AVE.
CINCINNATI 3, OHIO

For Sale

FOR IMMEDIATE SHIMPENT!
EQUIPMENT—UNUSED AND IN ORIGINAL CRATES.

Changes in production make this equipment available now. Can be inspected on premises. Subject to prior sale.

1—SAND SLINGER, Beardsley & Piper, Double Belt, Stationary, 19" Head, 4" Tip, 8'-0" First Arm, 4'-0" Ram Unit. Complete with starter and 440 V. Ramming Motor; PLATE FEEDER, 2-Ton, Complete with motor, Speed Reducer, Adjustable Gate, Intermediate Discharge Hopper, 440 Volt, A.C. Starter; BELT UNIT, 6'-0" with Sand Hopper, 2½ H.P., 440 Volt, A.C. Motor and Starter.
2—Herman 20" x 30"—6" Cylinder Jolt Molding Machines with 20" x 36" Hi-Speed Rollover and Pattern Drawing Devices, Pneumatic Flask Clamps, Discharge Roller Conveyer and Timing Devices.

USED EQUIPMENT
PRICED FOR IMMEDIATE SALE!

1—International Rollover, 24" x 40" Table.
1—International Rollover, 28" x 36" Table.
1—International Drag Rollover, 28" x 40" Table.
1—International Drag Rollover, 24" x 30".
2—International Type "LP" Size No. 6, (Like New).
3—International Rollover Type "G" 20" x 8".
2—International Type "RES," 15" x 8".
1—Osborn Drag Machine, Model 602.
1—Osborn Drag Machine, Model 601.
1—Tabor, Portable Type "HD" Rollover.
1—Cupola, Unit Complete, Size No. 6 with No. 5½ Roots Blower, and 35 H.P. 440 V. Westinghouse Motor and "V" Belt Drive.
1—Marschke Heavy Duty 220 V. Swing Grinder (Almost New).
1—Whiting Skip Hoist for No. 7 Cupola, 7½ H.P., 440 V.
1—Walker Alloy or Experimental Cupola, Coke Fired, 100 lb. capacity, portable, 3 tuyere, with individual motors and blowers.

WRITE OR PHONE WORKS MANAGER
THE CHICAGO HARDWARE FOUNDRY CO.
NORTH CHICAGO, ILLINOIS
PHONE DEXTER 6-5770

FOR SALE

6—#30 Tabor Hydraulic Jolt Rollover Pattern Draw Molding Machines, 30" x 41" table, 12" draw	$1100.00
6—Osborn 2047-4 Jolt Rollover, table 18" x 24", 8½" Draw, can be used as a core rollover	350.00
25—Tabor Pneumatic Molding Machines 10" squeeze	115.00
Osborn Molding Machine Portable #74	105.00
10—Adams Portable Hand Squeeze Molding Machines 13"	50.00
Wheelabrator Table #2 with 8-24" Multitables	2600.00
3—Pangborn 1GF Barrels, capacity 150 lbs.	250.00
Jeffrey Sanditioner Capacity 10-15 tons per hour	400.00
Pangborn EN 2 Cabinet	225.00

M. ELSTEIN
370 EAST HOUSTON ST.
NEW YORK 2, NEW YORK

FOR SALE

One—30" x 40" Tabor Shockless Jar Rollover Machine—with plate and quick changeover clamps.
Used less than three months, actual operation.
Excellent condition—priced to sell.

PHILLIPS FOUNDRY CO.
P. O. BOX NO. 82
BAKERSFIELD, CALIF.

FOR SALE

1 Milwaukee Jolt Rollover, Model No. 60-B-4, Serial No. 12471, Table size 30" x 60". Machine used only six months. Available for immediate delivery. Wire, Phone or Write:

SOUTHERN CAR & MFG. CO.
400—7th ST. SO. BIRMINGHAM, ALABAMA
TEL: 4-1714

For Sale

FOR SALE

MOLDING MACHINES
2—No. 275 Osborn jolt squeezers.
2—Deuscher Stationary jolt squeeze.
2—SPO #611B Stationary Oscillating Jolt Squeeze Strippers.
4—#610 Johnston & Jennings Air Jolt Rollover Draw Portable 24 x 30 table.
1—Tabor 36 x 50 table Air Jolt Rollover Draw, 3000# capacity.
2—International PKL 14"-5½" Jolt Squeeze Pin Lift.
1—Tabor Pedestal Core Rollover Hand Ram Rollover Draw 14 x 20 table 8" draw.
BLOWERS FOR CUPOLAS AND FURNACES
1—15 HP North American 2100 CFM at 16 ozs.
2—15 HP Spencer-Turbine 2250 CFM at 16 oz.
10—High temperature blowers 1400° F. 9000 to 15000 C.F.M.
2—#7½ Roots rotary blowers—27 x 81—14000 CFM.
1—Connersville rotary blower 22 x 66 45 cu. ft. per revolution 9000 CFM.
Maxon-Premix Blowers for Gas ¼ to 1 HP.
2—5 HP 20-oz. Spencer Turbine Blowers.
2—2 HP 20-oz. Spencer Turbine Blowers.
METAL MELTING EQUIPMENT
1—1000# open flame brass melting furnaces, gas fired.
1—Hausfeld Stationary Brass, Multiple gas burner, 200# cap.
1—Hausfeld Tilting crucible, gas, 250# Al Cap.
1—Hausfeld 2000# aluminum capacity furnace, barrel type, open flame, oil fired.
New 32" to 41" dia. shell cupolas made to order.
New 1000 lb. aluminum cap. tilting crucible furnaces to specifications.
MISCELLANEOUS
1—Beardsley & Piper Motive Sandslinger on rails, 19" head, 14' 6" swing, 3/60/220.
1—Simplicity Model B Sand Conditioning Unit, 4' x 8' double deck screens with aerator for piling.
1—Beardsley & Piper Screenarator, Model M, 3/60/220.
1—Stoney crane type shakeout.
1—Dings type M magnetic separator.
1—NC-4 sand separator.
1—#1 Demmler core blower.
2—#16 Roto-clone units complete.
1—McLeod Blast Tumbling Barrel, Size 36 x 36, Type S.
1—McLeod Small Sand Blast Barrel 24 x 24.
1—36W Wet Type Roto-Clone 34000 CFM.
1—24W Wet Type Roto-Clone 13000 CFM.
Complete stock of rebuilt mill and dust exhaust blowers.
1—27 x 36 American wheelabrator, tumblast with rubber belt.

CLIFTON MACHINERY COMPANY
1023 W. SIXTH ST. CINCINNATI 3, OHIO

FOR SALE

LIKE NEW—6 x 19 PREFORMED PLOW STEEL WIRE ROPE CHOKER SLINGS—MFR. "ROEBLING"
1½" x 20 ft.—Price—$10.00 each
1½" x 55 ft.—Price—$25.00 each
18" eye—spliced in each end.

J. A. DOUGHERTY
P. O. BOX 90
BALA-CYNWYD, PA.

FOR SALE

Whiting No. 8 Cupola
New in 1948—used 100 hours.
Cost $7500.00—Take $2500.00

JACK RODEGHIER
712 N. RAYNOR AVENUE
JOLIET, ILLINOIS

FOR SALE

Osborn #413-9 Molding Machine Serial 11947. Built in 1949.
Excellent Working Condition.

BALDWIN-LIMA-HAMILTON CORPORATION
HAMILTON, OHIO

FOR SALE

1—Ton per hour, size "R" Lectromelt Furnace complete with sub-station and 1200 KVA, 40° C. rise, indoor type, water cooled transformer. Primary voltage 13,800.

ROTARY STEEL CASTING COMPANY
1425 FIFTH STREET
DENVER, COLORADO

CLASSIFIED ADVERTISING

For Sale

FOR SALE

FURNACES
1—Hausfeld Tilting Furnaces, oil fired, with blowers, 150 and 200 crucible.
2—Ajax Induction Aluminum Furnaces, 400# capacity, one holding, like new.
2—Hausfeld Magnesium Tilting Furnaces, 1200# capacity. Lined.
7—Monarch #93 Barrel Type Furnaces with blowers. 1000# alum. 3000# brass.
1—3½ Whiting Cupola complete with skip hoist, charging bucket, mixing ladle, blower, Foxboro control.

BLOWERS
2—Spencer Turbo Blowers, 40 HP motor, 3600 CFM at 24 ounces.

SAND HANDLING EQUIPMENT
2—Handy Sandy—Reddy Sandy units, complete.
1—Tractor type Sand Slinger, 16" head, hyd. turning device, mag. separator.
1—Beardsley & Piper Tractor Sand Slinger.
4—Sandcutters, 48", 70", 76", and 80" cutting reels.
1—Jeffrey conveyor, 28' long, 20" belt, troughing Idlers, 5 HP motor and red.
1—50' long Conveyor, 19" wide belt, with motor and drive.

CLEANING EQUIPMENT
1—Pangborn #45, Type "M" Blast Room with collector.
1—Cyclone Dust Catcher, 10' diameter, 22" outlet, like new.

MOLDING MACHINES
14—Osborn #275J Portable Cantilever Jolt Squeezers.
2—Osborn #405 Rollovers.
1—Osborn #243 Rollover.
4—Osborn #276PJ Stationary Jolt Squeezers.
1—International Rollover, Model AN 1212, Ser. #45373, 30 x 16".
3—International Type "G", portable, 24" table, 10" draw.
1—Johnston & Jennings #918 Rollover Molding Machine.
1—Johnston & Jennings #815B Rollover.
1—Davenport #28A Rollover, max. flask 36 x 60", 12" draw, 28 x 44" table.
3—Herman Rollovers, 2—40 x 60", 1—60 x 80" tables.

LADLES
2—4 Ton Teapot Worm Geared Ladles.
2—"U" Type Modern Worm Geared Reservoir Ladles, 3000# cap. 34 x 60" I.D.
4—10 & 15 Ton Bottom Pour Steel Ladles.

OVENS
1—2 Compartment Foundry Equipment Oven, 12' D, 12' W, 7' H, gas or oil.
1—Mahr Heat Treat Oven, 8' wide, 3' deep., oil fired, side charge.

AIR COMPRESSORS
1—40 HP Sullivan Air Compressor, Model B-BIM #8, Serial No. 21661.

MISCELLANEOUS
1—DeWalt Cut-Off Saw, 10 HP, 3/60/220-440 Volt.
1—Truelift Truck, Ser. #29114, Type 700, Capacity 2000#.
1—Barrett Boring Mill, 27" swing, 7½ HP motor.
1—Howe Weighograph, 39 x 39", platform, 3000# capacity. Electric.
We have 200 Tons of Cast Steel, Structural Steel, and Sterling Type Floor Flasks, excellent condition. Send for Complete List #53-7.

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SHILLINGTON, PENNA.
PHONE READING 3-0311, 4-0146, 3-1021
R. B. HARRISON, FDRY. MGR.
J. P. IRWIN, FDRY. ENGINEER

TESTING MACHINES

1—Riehle 400,000# hydraulic and beam type Compression Testing Machine
1—Riehle 200,000# Universal
2—Riehle 100,000# Universal
1—T. Olson 100,000#
Also Simpson Sand Mixers 18" dia. Laboratory, #0, #1, #1½, #2, #3
Miscellaneous: Screens, Pulverizers, Grinders, Conveyors—all types, Tyler Rotap Screens, etc.
OUR 36th YEAR

CONSOLIDATED PRODUCTS CO., INC.
13-20 PARK ROW NEW YORK 38, N. Y.
TELEPHONE: BARCLAY 7-0600

For Sale

FOR SALE
SAND BLAST EQUIPMENT

Just released 6 Wheelabrators Tumblast, six 48 x 42. Your pick $3000.00
Wheelabrator size 48 x 48. Like new. $5250.00.
Wheelabrator Tumblast 36 x 42. $4500.00.
Wheelabrators Table Blast 8 and 10 ft. $3000.00.
Pangborn Table Blast 10'. $3000.00.
Sand Blast Cabinets, pressure tanks, dust collectors and blowers. All sizes.
Contact us for your sandblasting needs or any surplus sandblasting parts and equipment you have for sale.
Will accept your small machines as trade in on any of the above equipment.

DIAMOND SAND BLAST, INC.
5654 WEST JEFFERSON
DETROIT 9, MICHIGAN

PRIVATE SURPLUS EQUIPMENT

1—62" Calliau Cupola
1—54" Calliau Cupola
1—#9 B.F. Sturtevant, Fan Type Blower
1—Tabor Portable Jolt Squeeze molding machine 18" x 24" table. Used 2 months
1—Clark Bros. 30" Metal Band Saw
ANY REASONABLE OFFER ACCEPTED
VIRGINIA METALCRAFTERS, INC.
WAYNESBORO, VA.

FOR SALE

1—Moulder's Friend Sand Cutter, purchased new May, 1951 and used until September, 1952. Reason for selling—changed method. Serial #148, 60" wide, includes spare brush and parts $1,000.00
2—Haynes Portable Jolt Squeeze Molding Machines .....$100.00 ea.
4—#R-7 Rapid Jolt Squeeze Molding Machines, inverted to portable machines.....$60.00 ea.

TIOGA FOUNDRY CORPORATION
OWEGO, NEW YORK

For Sale

FOR SALE

One—Roots Positive Blower #7, capacity 11,500 cubic feet per minute at 1½ pounds, 195 R.P.M. Outlet 24" driven by Troy Type "ST" 14 x 12 vertical, throttling, self-oiling, enclosed steam engine. Engine new in 1947. Used very little.

THE NEW BRITAIN GAS LIGHT CO.
35 COURT STREET
NEW BRITAIN, CONNECTICUT

FOR SALE

Motors, Generators, Transformers from 1 HP to 2500 HP
World headquarters for T.E.F.C. and explosion proof motors.
World's largest inventory.

ELECTRIC EQUIPMENT CO.
ROCHESTER, N. Y.

FOR SALE

Model BG Simplicity Portable Shakeout, 3' x 5' deck size, 5,000 pound capacity, excellent condition. Complete with 7½ HP motor, 220 volt, attached .....$700.00.

NEENAH FOUNDRY COMPANY
NEENAH, WISCONSIN

For Sale

FOR SALE

Hines Aluminum Pop-Off Flasks in good condition with ¾" Rd. & ¾" Hex Pins. Complete with bail handles and 1½" steel flange. Available for inspection and delivery at 50% of today's market value, F.O.B. East Chicago, Indiana.

14" x 20"	6" & 8" Copes	5"-6"-7" & 8"	Drags*
16" x 20"	6" Copes	5"-6"	Drags*
16" x 24"	8" Copes		
14" x 20"	6" & 7" Copes	5" & 7"	Drags†
14" x 24"	5" Copes	5"	Drags†

* Heavy Duty. †Medium Duty.

AMERICAN STEEL FOUNDRIES
PURCHASING DEPARTMENT
410 N. MICHIGAN AVE. CHICAGO 11, ILL.
TELEPHONE: SUPERIOR 7-4080

FOR SALE

SAND DRYER AND COOLER, Bartlett & Snow rotary, 54" cylinder, 12' length, complete.
2 APRON CONVEYORS, under storage hopper type, 36" wide, 13' centers. Complete with 7½ H.P. motors, Link Belt reducer.
Equipment practically new
Engineering change eliminates use.

ILLINOIS FOUNDRY COMPANY
SPRINGFIELD, ILLINOIS

FOR SALE

20 Haynes Squeezers, 12" squeeze cylinder, very good condition, $250.00 each; 1 Model C-36 Ringlift Sand Conditioner, excellent condition, $6,195.00; 1 Model M American Sand Cutter, good condition, $2,000.00; 1—4' x 6' model D Simplicity Shake Out, good condition, $1,950.00. Address: **BROOKS FOUNDRY, INC., 1712 JACKSON ROAD, ALBION, MICHIGAN. PHONE: 2167.**

FOR SALE

AIR COMPRESSOR
Ingersoll Rand Type 10—14 x 9 x 12, 2 stage, 75 HP, 3/60/220/1200 rpm motor, 350 CFM at 100#.

BLOWERS
Spencer Turbo Blower 22.0 CFM @ 16 oz., 15 HP, 220/440 V motor. New 1946.
Ingersoll Rand SF24.

CORE BLOWER
Demmler #3E Dropaway Draw, New 1946.

CRANES
5 Ton P & H Overhead Elec. Traveling Crane, 30'6" span, 15' lift (can be increased) 3 motor, 220 V A.C. New 1946.
5 Ton P & H Overhead Electric 20'5" span, electric hoist, hand travel both ways, P/B control 440 V A.C.
10 Ton P & H Overhead Elec. Traveling Crane, double girder, fish belly, 3 motors, 230 V D.C., 54'7½" wide C to C of wheels can be cut down to fit smaller size.

CRUSHERS—PULVERIZERS
2—Stedman 15" x 12" Type A. One with 10 HP 220-440 V motor. One without motor.
7—Prater Blue Streak Pulverizers, 30 HP motor.

ELECTRIC FURNACES
2—Detroit Elec. Rocking Type, 300# heat transformers and one with extra shell.

GRINDERS
Fox 10 HP 3/60/220 V Swing Frame.
U. S. 15 HP, 3/60/440 V Swing Frame.
Hammond 7½ HP, Type W.H. High Speed 2" x 20" wheel.
McCabe High Speed Double End, 2" x 24" wheels.
Ransom S B Double End 2" x 20"
Fox 15 HP Swing Frame.

HOISTS
Ingersoll Rand 4000# Type D Air Hoist, late type.
500# American LoHed.
1000# Cleveland 220/440 V.
1000# Detroit 220/440 V.
5—1000# P & H Hevi Duty with trolley.
2—2000# P & H Hevi Duty with trolley.
2000# Detroit Electric.
2000# American LoHed.
11—4000# P & H Hevi Duty with trolley.
2—4000# P & H Hevi Duty with trolley and powered drive unit for moving hot metal.

LADLE
3 Ton Whiting geared ladle. Like new.
5 Ton Whiting Mixing Ladle on wheels.

MAGNETIC PULLEY
Perma-Mag 18 x 18.

MOLDING MACHINES
2—Champion Pin Lift Pushoff, 44" x 44" x 12".
2—Champion Pin Lift Pushoffs, 46" x 46" x 12".
1—Champion Jolt Squeeze Strip Molding Machine, column type, 12" jolt cylinder 8" lift, 18" x 21" table.
1—Champion 24 Hand Clamp rollover 26" x 16" table.
1—Herman 20" x 30" Rollover Pattern draw 6" bumper.
1—Herman 4000# High Speed Rollover 30" x 60" with 32" x 48" bumper, 13" cylinder pattern device.
1—Herman 20" x 24" Jolt Rollover Pattern Draw. Like New.
1—Osborn 601-13 Portable Jolt Rollover Pattern Draw, 30" x 24" flask size, 10" draw, 900# cap.
1—Molding Unit, consisting of Osborn 23" x 24" table, Jolt squeeze and Osborne 17" x 24" 814P Rollover with overhead hopper for each machine, 1 with bottom dump, other with flat belt sand delivery.
1—Tabor, 1000# Rollover 30" x 5', Excellent condition.
5—International Type G.

MULLERS
Simpson #1.
Simpson #2, bucket loader, motor on base plate.
Simpson #3, motor on base plate.
Simpson #3, Type H.
Clearfield #404, 5 HP 440 V motor.
Kwick Mix Paddle type portable.

ROD STRAIGHTENER
Pneumatic Guillotine Type.

ROTOCLONE
Size 24, Serial 9441 with chain type ejector, 40 HP, 3/60/220 V motor.

ROTOBLAST
Pangborn, table with 3-8" rotating work tables, 3 position loading, cleaning and touch-up designed for work similar in size to aircraft cylinders. Like New condition.

SHAKEOUTS
1—3' x 5' Link Belt.
2—4' x 6' Simplicity.
1—6' x 9' Simplicity.

SLINGER
B & P Motive Type, 19", two speed head, 25 HP. Perma Magnet, bucket elevator to load tank, storage bin with conveyor to elevator.

TUMBLING BARRELS
Sly 30" x 60" with dust collector and reduction drive.
We are now dismantling a sand preparation unit at Baltimore for sale by the piece.
21' x 24" Belt Conveyor, 5 HP Syncrogear motor drive.
46' Bucket Elevator 8" x 12" buckets, 7½ HU Syncrogear drive.
46' Bucket Elevator 8" x 12" buckets, 7½ HP Syncrogear drive.
48' Bucket Elevator 8" x 12" buckets, 7½ HP U. S. Motor, Falk Drive.
32' Bucket Elevator 8" x 12" buckets, 7½ HP U. S. Motor, Falk Drive.
Rotary Screen 5 HP U. S. Syncrogear Motor.
Hopper 10' x 15' x 14' deep, 3 bottom gates bolted construction.
17' x 9' Flat Belt conveyor with Magnetic Pulley.
Hopper 13' x 15'-20' deep bolted construction.
19" x 34' trough belt, belt drive, less motor.
20" x 16' Flat belt conveyor, less motor.

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Celebrating Our 5th Anniversary

• We wish to extend our gratitude to the Foundry Industry for giving us the opportunity to serve you, and for the response that you in turn have so generously given us.

As a token of our appreciation, we wish to place ourselves at your disposal throughout the years.

Feel free to consult us on any of your foundry equipment problems and accept this as our invitation to make A. A. A. MACHINERY & EQUIPMENT CO. your headquarters whenever you find it necessary to be in our City, no matter what the reason be. Telephone us from your point of arrival and we shall be glad to arrange for your pick up.

Call or wire collect, if there is anything we can do for you, whether it be a hotel reservation or your need to procure or dispose of any foundry equipment.

MOLDING MACHINES

10—Osborn #559 Jolt Stripper Machines, Table size 25" x 30", Jolt 1200 lbs capacity.
1—Osborn #333 H Jolt, Squeeze, Power Rollover, Pattern Draw, 2000 lbs Jolt, 22" x 44" Table, Jolt Cylinder 12", Draw 22", Squeeze Cylinder 18".
1—Osborn #332 Osborn Jolt, Squeeze, Rollover, Pattern Draw, Draw 9", Flask Size 25" x 36".
1—Osborn #816 Jolt Squeeze Stripper, Squeeze Cylinder 16", Jolt Capacity 1000 lbs.
6—Osborn #2047 Jolt Rollovers, 8½" Draw, Flask Size 22" x 16" x 10⅛" deep, 600 lbs capacity, 1943 Machines.
5—Osborn #275 J Jolt Squeeze Molding Machines.
2—Osborn #405 Jolt Rollover and Pattern Draw Molding Machine, Very Late.
10—International Core Machines, Hand Rollover, Hand Jolt.
1—International Core Machine, Hand Rollover, Power Jolt, Table Size 13" x 17".
1—International Jolt Pin Lift, Size 42—6.
2—Johnson & Jennings Model 918, Jolt Rollover and Pattern Draw, Table Size 44" x 54" 20" Draw.
1—Johnson & Jennings Jolt Squeeze Molding Machine, Serial Number 20873194.
3—Milwaukee Model 123—13, Jolt Squeeze Machines, Air Operated by foot valves.
4—Champion Jolt Pin Lifts, Size 42—6.

GRINDING EQUIPMENT

1—Besley Dry Grinder Model #372, Circular Shape, Size 53" Morton 20MT4 abrasive disc, Serial 283442, Motorized 20 H.P. Howell, 1943 Machine, used 1 year.
1—Hammond Model WR—1 Double End Grinder, Snagging, 7½ H.P. 220/440, 60 cycle 3 phase, 1943 Machine.
2—Hammond Model WH—10 Double End Grinders with (2) 7½ H.P. 220/440 Volt Motors, Wheel Size 20" x 2" x 2", Serial Number 7239 and 7240.
2—U. S. Electric Model 20 Double End Grinders, 5 H.P. 220/440 Volts, Wheel Size 20" x 3" x 2".
1—Queen City Model 100 Double End Opposed Disc Grinder, with 10 H.P. 220/440 Volt Motor, Size 20" x 2" x 2", Very Late Machine.
1—Fox Swing Grinders Model #6, Wheel Size 20" x 2", 15 H.P. Motor.
1—Mummert Dixon Swing Grinders, 10 H.P. 220/440 Volt Motor, Model #2016, 20 x 3 x 10 Wheels.

SAND CONDITIONING EQUIPMENT

2—Beardsley & Piper Model S Screenerators, portable, on Pneumatic Tires, Serial Number SS—2902—4710.
2—Royer #2 Sand Conditioners, Portable Models.
1—Royer #NDS 42 Sand Conditioners, Stationary Type.
1—Jeffrey Type P Sand Conditioner, Class B Mixer, Portable Type, Serial #377.
1—American Sand Cutter, Model AM, Size 69 x 45, 1945 Machine.

MELTING FURNACES

2—Fisher Melting Furnaces, Model MNP, Gas Fired, 1700 lbs Capacity Aluminum, Electrical Tilting Mechanism.
1—Holding Furnace, 300 lbs Capacity.

HEAT TREAT FURNACES

1—Eclipse Gas Fired Furnaces, 4 Burners, 18" x 20" x 60" inside dimensions equipped with motor and blower, 1944 Machine.
1—American Gas Furnace Model DC, 10" x 16" x 26" inside dimensions, 1600 degrees to 2350 degrees F.

CORE OVENS

1—Lanley Core Oven, 6' high, 3' deep, 7' wide, 4 doors, 1950 Machine, Used Very Little.
1—Coleman Core Oven, gas fired, 4 doors opening into single compartment, 42" wide, 50" high, and 31" deep, adjustable trays on 3" centers.
1—Coleman Core Oven, Gas Fired, 15' x 10' x 8', drawer type.
1—Young (3) Compartment Pull Drawer Oven, FOR MAGNESIUM, each compartment 6'6" wide x 5'9" deep, x 7' high inside, (3) Drawers to compartment. Electric heating for temperature of 800°. 6" rock wool insulation, recirculation system for fan, complete with Micromax temperature controls and switches. Also 5 H.P. 1800 R.P.M. 440 Volt, 60 cycle, 3 phase Motor, A.C. Fan Cooled, with starter for same. *For Heat Treating, Drawing or Stress Relieving* ..... LIKE NEW.

CORE BLOWERS

1—Osborn #91 Core Blower, Serial #10050—F.
3—Osborn #92 Core Blowers.
1—Demmler #3—E Core Blower.
2—Redford Bench Type Core Blowers.

SAND BLASTING EQUIPMENT

1—American Wheelabrator Tumblast, Belt Type, 15" x 21", 1 Cubic Foot capacity complete with dust collector elevator, Serial #A70074, 1946 Machine.
1—Tumbling Barrel 28" diameter, 40" long, equipped with 7 H.P. Motor and Speed Reducer.
1—Pangborn Rotoblast Rocker Barrel Cleaning Machine, Model #28, type GK-2, capacity 28 cubic feet per charge, with loader and electrical equipment.

MULLERS

1—Simpson #2 Sand Muller. Complete with skip hoist, motor & drive.
1—Beardsley & Piper #30 Speed Muller. Complete with skip hoist, motor & drive.

LIFT TRUCKS

2—Baker Raulings Electric Fork Lift Trucks, 4,000 lbs. capacity, 119" lift, 1945 Models, used 1 month. Like New.
1—Automatic Platform Lift Truck, 3,000 lbs. cap. lift 6', battery operated.
1—Yale & Towne Platform Jitney, Electric, gasoline generating, 6,000 lbs. capacity with 1-36 Volt Ready Power Unit, Serial No. 5516.
5—Lewis Sheppard 4,000 lbs capacity, Jack Lift Trucks, hydraulic, 1950 models, 28" x 40", will take 10", 11", or 12" skid.
1—Ready Power Unit, 6 cylinder, 36 Volts.

SHAKEOUTS

2—Simplicity Shakeouts, 3' x 3' Serial #33—SOS—106, Model S, 1000 lbs Capacity.
1—Simplicity Shakeout, 4' x 6', Model D, 16,000 lbs capacity, equipped with 10 H.P. Motor.
1—Simplicity Shakeout, 5' x 7', Serial #57—SOBG—185, Model BG, 5000 lbs capacity.
1—Simplicity Shakeout, 4' x 6', Serial #46—SOB—145, Model B.
2—Simplicity Shakeouts, 4' x 8', Serial #48—SODE 104, Model DE, 16,000 lbs capacity.
1—Robbins 4' x 10', Floatex Model, Serial F—609, with 7½ H.P. motor & V belt drive.
1—Robbins Gyrex 4' x 8', 3 deck unit.

AIR HOISTS & AIR WINCH

7—Ingersoll Rand Air Hoists, Size D, 4,000 lbs capacity, complete with low overhead trolley
2—Ingersoll Rand Air Hoists, Size E, 10,000 lbs capacity, complete with low overhead trolley.
1—Ingersoll Rand Air Hoist, Size D-6, 6,000 lbs capacity.
3—Ingersoll Rand Air Hoists Size B, 1,000 lbs capacity.
1—Ingersoll Rand Air Hoist, Size C, 2,000 lbs capacity, not low head room.
1—Ingersoll Rand Air Winch, Size MHO, Serial #185, used for pulling railroad cars.
1—Little Giant Air Hoist, Model A, 1,000 lbs capacity.

ELECTRIC HOISTS

1—Shaw Box Load Lifter Electric Hoist, 4,000 lbs capacity, 440V, 3 ph, 60 cycle, NEVER USED, LIKE NEW.
1—Tramrail Electric Hoist, 1000 lbs capacity, complete with trolley, 220V, 3 phase, 60 cycle.
2—Yale Towne Electric Hoists, 2000 lbs capacity, heavy duty, 220V, 3 phase, 60 cycle totally enclosed motors, explosion proof, Completely Rebuilt, 1 with powerized trolley.

CONVEYORS—Apron, Roller, Belt

1—12' Powerized Belt Conveyor, 24" Belt.
1—18" x 24' Apron Conveyor, Steel Link Belt, complete with motor and drive.
1—24" x 20' Apron Conveyor, Steel Link Belt, —less motor and drive.
1—Pig Mold Conveyor (Link Belt) 74' long, complete with drive, for aluminum and magnesium.
80'—24" Above Rail Roller Convey, 1½" Rollers, 8" centers, in 10' Sections.
2000'—20" and 24" ABOVE RAIL CONVEYOR, 2½" ROLLERS ON 4" AND 5" CENTERS, HEAVY DUTY, EXCELLENT CONDITION.

TESTING EQUIPMENT

1—Gagan Brinell Testing Machine, 3000 KG, 1945 Machine, NEVER USED.
1—Riehle Tester, 100,000 lbs capacity, Screw Type.
1—Riehle Tester, 150,000 lbs capacity, Screw Type.

LADLES

1—Whitting Ladle, 2 Ton, Tilting Totally Enclosed.
1—Barrel Type Pouring Ladle, 300 lbs capacity.
2—Ladle Hoists, Hand Operated, 500 lbs capacity.

MISCELLANEOUS

1—Climax Wire Straightener, 1/16" to ¼" capacity with 3 H.P. Lima Drive. Unit.
1—405 Rollout Car.
1—Ready Power Unit, 6 cylinder, 36 Volt.
1—Howe Platform Scale, 3' x 4' Platform.
2—Cyntrons, Vibra Flow Feeder, type F210, Style 1538, Never used, Ser. A7F28932.
1—Portable Pyrometer, Furnace.
2—Magnetic Pulleys, 24", DC with M.G. set.
2—Spencer Blowers, 5400 CFM, 16 oz. 40 H.P. 220/440 V. motor.
1—6 & 12 Volt Battery Charger M.G. set mfg. by G.E.

Always in the Market for Used Foundry Equipment, One Piece Or a Complete Foundry.

A.A.A.

MACHINERY & EQUIPMENT CO.

856 EDDY ROAD—CLEVELAND 8, OHIO

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Dear Reader:

For many years (over 50, in fact), FOUNDRY has conducted an exhaustive census of the foundry industry in the United States and Canada. Every-other-year, figures are compiled reflecting existing capacity and number of foundries by types.

In our September issue, complete statistical information on the industry will be published. You will be interested to learn that there has been a net gain of 71 foundries since our last count in 1951. There are at the present time a total of 5,938 foundries in the United States and Canada (5,387 in the U. S., 551 in Canada).

One could jump to the conclusion that there has been little overall change in the industry during the past two years. Just the opposite is true, as has been the case each time a census tabulation is made. Actually, one out of four foundries will undergo some statistical change in any two year period, if our census experience is any indication, and we think it is.

For instance, since 1951 we have removed 497 foundries from our records because they have gone out of business, have merged, or have suspended operation. At the same time, we have officially recorded 570 new foundry operations, all new enterprises for the most part. Company name and address changes of consequence will average around 300. Changes in melting equipment and capacities, departments added or discontinued, metals melted—are literally too numerous to tabulate. For the benefit of castings buyers, suppliers and others, the complete list of all foundries in the industry is published in loose-leaf directory form as *Penton's Foundry List*. The new 1953-54 edition is now in the hands of the printer and will be available for distribution on or before September 15.

(*Next page, please.*)

(*Continued from page* 279)

Thanks: Our mailing department and art staff appreciated your favorable comment, Mr. Peter Rentschler, saying that you like our new mailing cover. We are always delighted to have the commendation of the President, Hamilton (Ohio) Foundry and Machine Co.—and of all readers who will take time out of busy days to correspond with us.

—o—

Congratulations: to our foundrymen readers at the Maytag Co. in Newton, Iowa, who recently celebrated production of their 8-millionth washer. Pleased with this production achievement are Maytag personnel in the picture above. From the left are P. H. Cobbs, manager of the Maytag Automatic Plant; L. C. McAnly, manager of manufacturing, shaking hands with William Muck, plant electrician and co-chairman of the Labor Management Council; and Tom Cowan, superintendent of machining at Maytag's Plant No. 2 and co-chairman of the Maytag Labor Management Council.

—o—

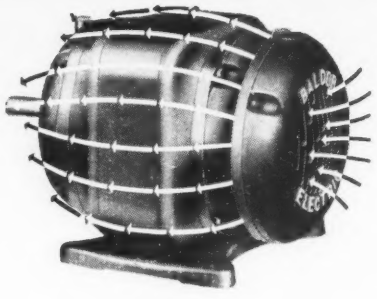
Future: It looks good to American Standard & Sanitary Corp. according to comments made in Cleveland recently by Howard L. Spindler, vice president, public relations. The need was described for about 1,000,000 or more new homes each year until 1960 and a potentially huge modernization market. Considering the home requirement for plumbing and heating equipment, castings should figure importantly in this particular phase of our expanding economy.

—o—

Market Fact: We are told that it takes 140,000 bushels of corn products a month to make cores for Ford's foundries. Our own estimates for the entire industry are that foundries annually consume 163,000,000 pounds of cereal binder.

Business Manager

FOUNDRIES
NEED THIS
Totally
enclosed
MOTOR



Arrows indicate the forced air movement over the entire exterior of the BALDOR STREAMCOOLED® motor frame.

The BALDOR®
STREAMCOOLED
Motor

These BALDOR ball-bearing motors are SOLIDLY ENCLOSED, cooled by an outer-mounted fan in the bell-end. They cannot inhale dirt, dust, grit or metal particles. BALDOR STREAMCOOLED Motors require no dismantling for cleaning. Thus less servicing—no interruption of production. Let us tell you more about these long service life BALDOR Motors (which are sold and serviced in more than 300 Trade Centers).

BALDOR ELECTRIC CO.
4353 DUNCAN AVE. • ST. LOUIS 10, MO.

Baldor
MOTOR SPECIALISTS FOR 30 YEARS

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COLUMBIA-SOUTHERN SODA BRIQUETTES

For SPEEDY, ECONOMICAL DESULPHURIZATION

- Use in blast furnace operation or foundry
- Add Soda Briquettes to ladle or cupola
- Pellet shape provides maximum surface area for increased contact with iron
- Desulphurizing action is fast and thorough
- Soda Briquettes are dustless and convenient to handle
- Packed in 100 lb. paper bags for ease in moving and storage
- Sold by all leading supply houses. Order by name "Columbia-Southern Soda Briquettes."

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SUBSIDIARY OF PITTSBURGH PLATE GLASS COMPANY
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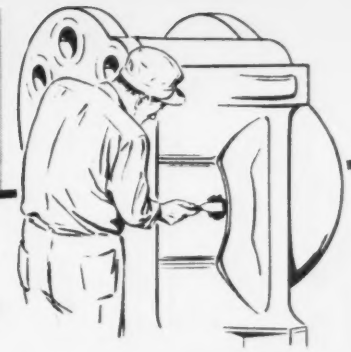

These features mean BETTER LOOKING CASTINGS

TIGHT, LASTING REPAIRS

When correcting blow or sand holes, surface blemishes, or rough and porous areas in castings, you can depend on Smooth-On Foundry Cements, standard of the industry for more than 55 years. They are easy to apply, harden quickly, stay firmly in place.

FIVE DIFFERENT SHADES

With 5 different shades to pick from, you know you can get a close match for your castings.

4AA—Light gray, fine texture
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4B —Dark gray, coarser texture
also
8—Aluminum
9—Bronze or Brass

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Rigid quality control means you can be sure that the strength and color of Smooth-On Foundry Cements will not vary from one order to the next. Every lot of Smooth-On cements is laboratory tested and must satisfy tests for setting time, hardness, and color before it is packed for shipment.

FREE SAMPLES

Why not try one or more of these Foundry Cements at our expense? We will be glad to send you a free sample of any of the cements described above if you will write us on your business letterhead. Write today, and see how Smooth-On can improve the appearance of your castings.

SMOOTH-ON MFG. CO. DEPT. 17
570 Communipaw Ave., Jersey City 4, N. J.

SMOOTH-ON
FOUNDRY CEMENTS

SO-389

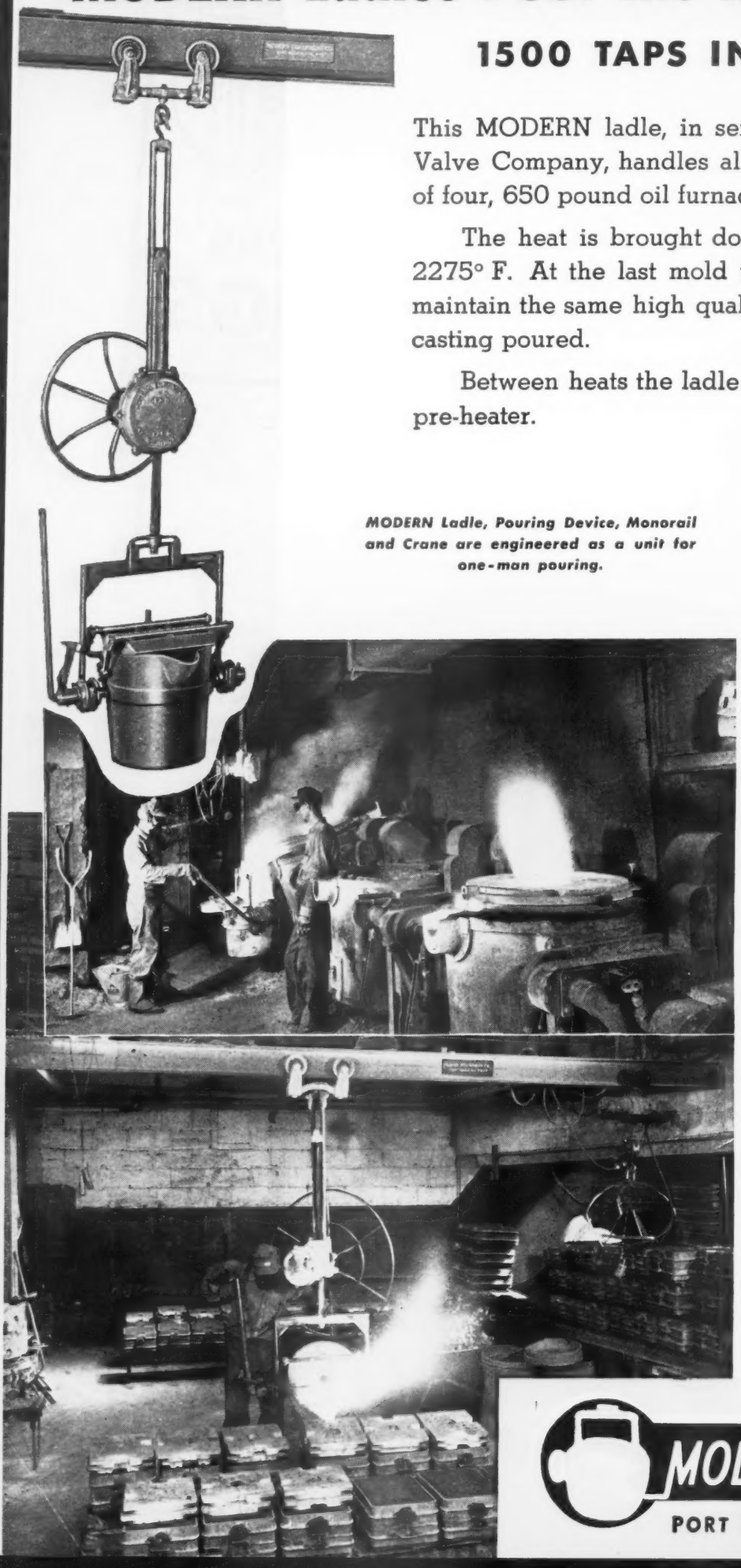
MODERN Ladles Pour the Nonferrous Metal

1500 TAPS IN THREE MONTHS

This MODERN ladle, in service here at the Milwaukee Flush Valve Company, handles all the plumber-brass from a battery of four, 650 pound oil furnaces.

The heat is brought down in one hour. Metal is tapped at 2275° F. At the last mold the brass still flows at 2100° F. to maintain the same high quality from the first to the twenty-fifth casting poured.

Between heats the ladle temperature is brought up in an oil pre-heater.



MODERN Ladle, Pouring Device, Monorail and Crane are engineered as a unit for one-man pouring.

Every detail of design — from the fast-action, pull-back ladle cover to the free movement and smooth transfer of the load over the monorail and crane—is a part of MODERN planning for economical, one-man pouring.

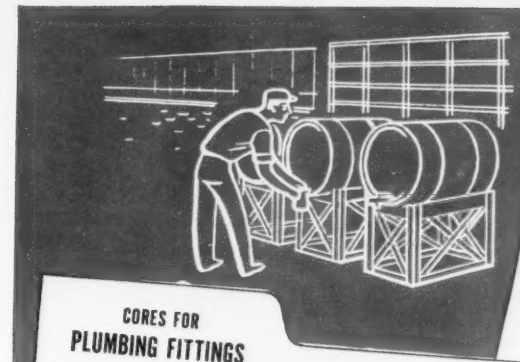
Here the entire heat, 650 pounds of brass, is drawn in two taps. 325 pounds per trip from furnace room to pouring floor uniformly fills the 25 molds in approximately six minutes.

There's seldom any metal left over to be pigged. Every ounce crosses the pay scale.

It'll pay you well to pre-plan your pouring for profits. And the savings you make on your MODERN engineered-to-the-job ladles can be applied to your purchases of MODERN POURING DEVICES, MONORAIL SYSTEMS and foundry CRANES! For the complete MODERN story call your local MODERN representative. Ladle catalog 149 will be mailed free if you make request on your company letterhead — Dept. F-8.

MODERN EQUIPMENT CO.

PORT WASHINGTON, WISCONSIN



CRANKCASE CORES

PROBLEM: Soft rammed core areas. Lowered production from slow sand handling and flowability.

SOLUTION: Add one pint Stevens Sand Conditioner to ea. 1500 lbs. core sand.

RESULTS: Blown crankcase cores show increase of 5 points in green hardness.
Vents stay clean, soft rammed areas greatly reduced.
Core Boxes free from gum.

CORES FOR PLUMBING FITTINGS

PROBLEM: 3 or 4 blows required to obtain usable core—production limited. Vents required constant cleaning because soft ram frequently occurred in offset neck on core.

SOLUTION: 2 Qts. Stevens Sand Conditioner added per ton of sand.

RESULTS: Production increased 30%. Most soft ram disappeared. Vents require limited cleaning after 60 blows. Signs of gumminess disappeared.

JACKET CORES

PROBLEM: Overmulling caused rapid decrease of green strength.

SOLUTION: Stevens Sand Conditioner.

RESULTS: Using Stevens Sand Conditioner—overmulling does not affect mix.
Green hardness of cores increased from 12 to 15%.
Required number of jolts for large cores made on jolt machine reduced from 18 to 14.

A solution to your CORE PRODUCTION PROBLEMS . . .

STEVENS SAND CONDITIONER

The cases above, taken from our records, show what Stevens Sand Conditioner has done to assure better castings for a few of the many satisfied Stevens customers. Here's how Stevens Sand Conditioner helps core problems:

1. Increases flowability and ramability of core sand containing cereal flour and core oil, or phenolic resins.
2. Cores are more easily released from all types of core boxes.
3. Keeps sand from sticking in hoppers, conveyors, mullers and all types of sand handling equipment.
4. Reduces dusting and loss from a muller of fines from cereal flour, resins, wood flour and clay.
5. Prevents the loss of green strength on overmulling the sand.

Get facts about this non-toxic, low-cost Sand Conditioner today. Call your Stevens Sales Representative, or write direct for Stevens Technical Bulletin F 101. FREDERIC B. STEVENS, INC. Detroit 16, Mich.

FREDERIC B. STEVENS
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EVERYTHING FOR A FOUNDRY
DETROIT 16, MICHIGAN

BRANCHES: BUFFALO • CLEVELAND • INDIANAPOLIS • NEW HAVEN
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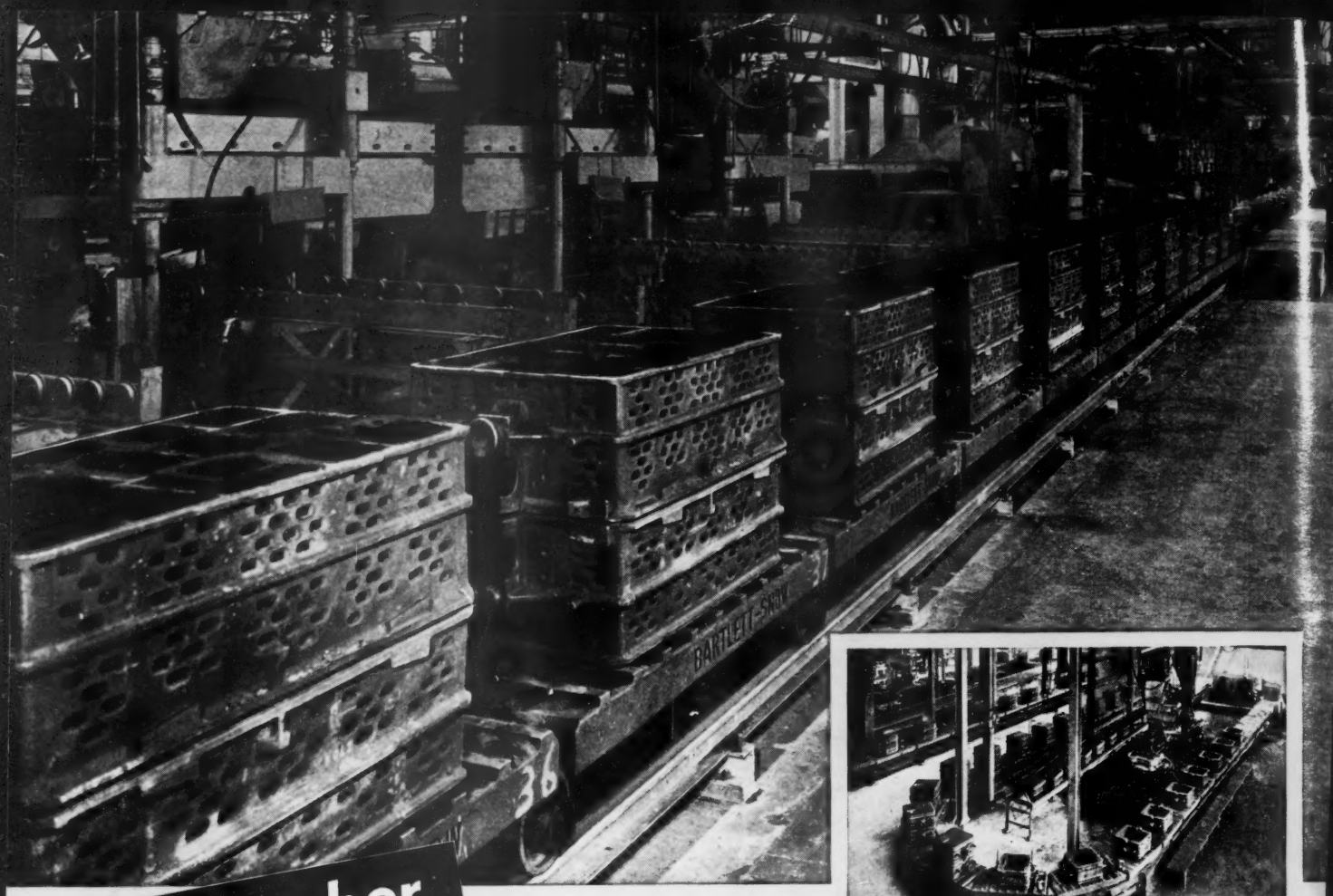
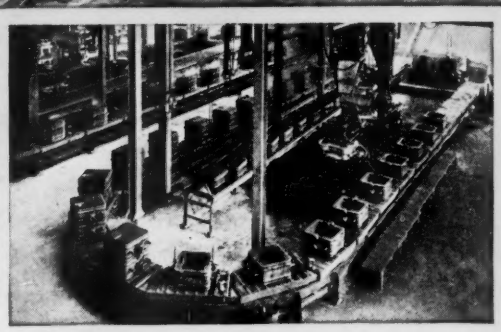
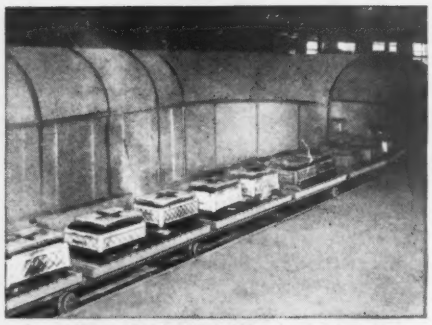
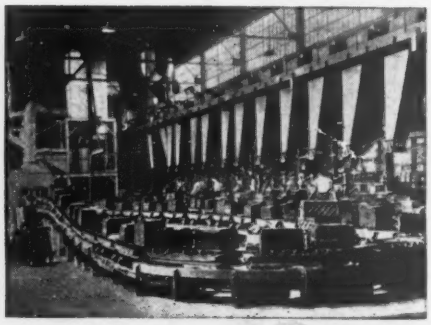




Remember your *Mold Conveyor*



Snap Flask Molds With Weights and Jackets Passing from Pouring Zone into Smoke Tunnel.



General View of Mechanized Jobbing Foundry Showing Bartlett-Snow Mold Conveyor with Elevated Shakeout and Self-Dumping Cars.

is the only piece of equipment that handles *All* the core sand, *All* the molding sand, *All* the metal and *All* the flasks in your foundry. It should be of rugged, durable construction.

● Built with heavy, ribbed, overlapping cast iron car tops — large diameter straight faced anti-friction wheels — through shafts connected to heavy duty roller chain that is center guided around the entire loop—and smoothly driven through a variable speed caterpillar drive, Bartlett-Snow floor type mold conveyors are unsurpassed for long, dependable operation. Horizontal or up-and-down designs available — single or double axle type.

DESIGNERS
ENGINEERS

BARTLETT-SNOW
CLEVELAND 5, OHIO

FABRICATORS
ERECTORS

Foundrymen Who Know — Buy Bartlett-Snow